```
**********************************************************************
*                                                                    *
*          QQQQQQQ      ZZZZZZZZZ    XX      XX                     *
*         QQQQQQQQQ     ZZZZZZZZ      XX    XX                      *
*         QQ      QQ          ZZ       XX XX                        *
*         QQ      QQ         ZZ         XXX                         *
*         QQ      QQ        ZZ          XXX                         *
*         QQ   QQ QQ       ZZ           XX XX                       *
*         QQQQQQQQQQ      ZZZZZZZZ     XX   XX                      *
*          QQQQQQQQ       ZZZZZZZZZ   XX     XX                    *
*                 QQ                                                 *
*                                                                    *
**********************************************************************
```


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COMING UP:
A short rest for the editor
no telling what else

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Editor's Note:
Programs are either 'cut & pasted' and put with the heading where practical, or will appear after the article at the most convenient insertion point.

Votrax Speech Synthesizer

by

James Oisebe, *****

Here is a 'term paper' written by one of my students who tackled the job of interfacing the Votrax SC-01A chip to his TS1000. He is presently working on a nice 'menu driven' program, similar to that described for the Parrot, which will give him a lot more versatility.

PHONEME SPEECH SYNTHESIZERS

Voice is the most natural way for humans to communicate, and so throughout the brief history of computers, designers have sought to make these electronic machines increasingly human-like. Computer interfaces that produce and recognize human speech open up an important and versatile communication channel between humans and machines.

Not so long ago the talking computer or robot existed only in science fiction. But with much development in speech processing devices, speech synthesizers are becoming increasingly important in our daily life.

Techniques of Speech Synthesis

Three main techniques are presently being used to directly synthesize human speech. They are formant synthesis, linear predictive coding (LPC), and waveform digitization. By far, the most versatile technique in use today is phoneme speech synthesis, which is the technique used in my project. I will talk much more about phoneme speech synthesis later on in this report.

Now let me briefly describe the first three techniques used in human speech synthesis:

Formant Synthesis--this is a technique for modeling the natural resonances of the vocal tract. For recognizable speech, at least three format should be used for each voice utterance. Voiced sounds are generated from an impulse source that is modulated in amplitude to control intensity. Unvoiced sounds are generated as white noise passes through a variable-pole-zero filter. The coefficients of these filters are stored in ROM. An approximate number of memory bits required for a second of speech is 400.

Linear-Predictive Coding (LPC)

Very similar to formant synthesis. Both are based in the frequency domain and both can use similar hardware. A basic difference though is that LPC uses previous conditions to determine present filter coefficients. The quality of the synthesis improves as the number of coefficients increases. With ten coefficients, an approximate number of bits per second required for speech is 1200.

Waveform Digitization

This was one of the earliest approaches taken for speech synthesis. It relies on nothing more than sampling of waveform in the time dormain at twice the highest frequency of interest (known as the nyquist rate). However, critical to this technique is data compression, otherwise the memory requirements are prohibitive.

Now to get down to the heart of the report, I am honored to introduce to you the slim, light, and relatively cheap, unlimited vocabulary phoneme speech synthesizer, the one and only VOTRAX SC-01A chip. Handling of the SC-01A is important, because it is made of complimentary metal oxide semi-conductor technology, which makes it highly susceptible to damage by static electricity that is always present.

General Operation of the SC-01A

The SC-01A is a 22-pin integrated circuit which consists of a digital code translator and an electronic model of the human vocal tract. The internal phoneme controller translates a 6-bit phoneme code and a 2-bit pitch code into a matrix of spectral parameters that adjust the vocal-tract model to synthesize speech.

The SC-01A operates within a range from ±7 volts to ±14 volts. Handshaking with external circuitry is accomplished through a strobe (STB) line and an acknowledge/request ($\overline{A}$/R) line. Figure 1 is a diagram of the generalized micro-computer connection scheme.

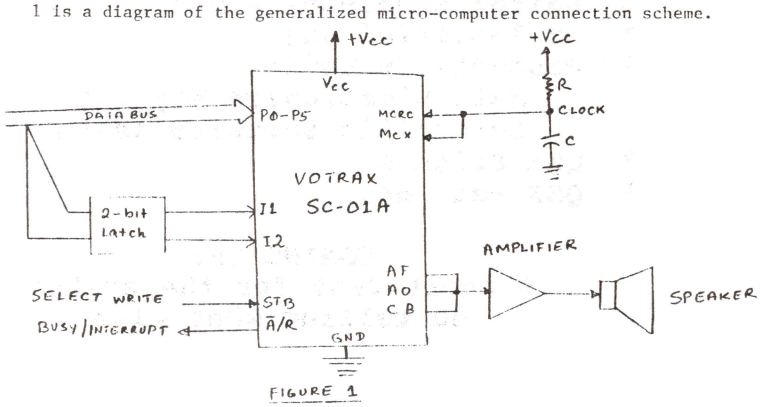

FIGURE 1

The output pitch of the SC-01A's voice is controlled by the frequency of the clock signal, which can either be supplied from an external source or set internally with resistor/capacitor combination. The clock frequency is normally 720 KHz, but subtle variations of pitch can be induced to add inflection by varying this frequency. Such variations prevent the synthesized voice from sounding too monotonous or artificial. Two separate pitch-

control lines, I_1 and I_2, are available for gross variation in pitch so that the chip can seem to speak with more than one voice. These so called manual-inflection controls operate independently of clock-rate-induced inflection.

There ~~are~~ 64 phonemes stored in the SC-01.

They are defined for the English Language but since speech is just a sequence of sounds, then the phonemes can be used to synthesize speech in almost any language. Most of these phonemes correspond to speech sounds, but two produce silence and one causes speech synthesis to stop.

Generating the Phoneme Sounds

The sound for each phoneme is generated when a 6-bit phoneme code is placed on the control-register input-lines (P0 through P5) and latched by pulsing the strobe (STB) input. Each phoneme is internally timed and has a duration ranging from 47 to 250 MS (milliseconds) depending on the phoneme selected and the clock frequency. The $\overline{A}$/R line goes from a logic 1 to a logic Ø while a phoneme is sounding.

The method I applied in using the SC-01A to produce the phoneme sounds was with a micro-computer. The computer I used was a TIMEX SINCLAIR 1000 with 8K ROM and 2K RAM memory capacity. Figure 2 is a schematic diagram of the SC-01A based phoneme speech synthesizer, which is interfaced to the Timex Sinclair 1000 micro-computer. This method sends phoneme codes to the synthesizer chip through a latched parallel output port of the 8255 parallel interface chip and monitors the synthesizer's activities through the $\overline{A}$/R line, which is connected to an input port or interrupt line.

Method of Connection

The majority of the circut was wire-wrapped. I found wire-wrapping to be a neat method compared to soldering, it enabled easy correction in case of an error.

The software used to access the SC-01 phoneme sound with the Timex Sinclair 1000 micro-computer was a simple program written in BASIC. A listing of the program is given on the next page.

The phoneme codes were entered in decimal, with each number corresponding to the phoneme sound required.

An example of how the decimal code was determined is discussed below.

Let's take the name OISEBE for example.

1) The phoneme symbols required to generate the word are looked up in the phoneme chart.

i.e. O I S E B E

O I S EH1 B EH1

PROGRAM

```
 2        FAST
 5        DIM A (50)
10        POKE 8195, 129 (initialize PIO Chip)
20        POKE 8192, Ø   (clear PORT A)
30        POKE 8193, 255 (sets STROBE HIGH)
40        LET X = 1
50        PRINT "PHONEME (99 to STOP)
60        INPUT A(X)
70        IF A(X) = 99 THEN GOTO 100
80        LET X = X + 1
90        GOTO 50
100       LET A(x) = 63 (inserts a STOP)
110       FOR Y = 1 To X
120       POKE 8192, A(Y) (OUTPUTS DATA)
130       POKE 8193, Ø   ( STROBE the
140       POKE 8193, 255 ( 1 SHOT
150       IF PEEK 8194 <> Ø THEN GOTO 150 (checks for
                                           busy signal)
160       NEXT Y
170       GOTO 40 (11Ø TO REPEAT WORD)

          8192    A PORT
          8193    B PORT
          8194    C PORT
          8195    CONTROL
```

2) The corresponding decimal code was also looked up in the same table.

i.e. O I S EH1 B EH1

38 39 31 Ø2 14 Ø2

3) Next the decimal codes were sequentially entered into the computer. The computer then accessed the phonemes sequentially and the sounds extracted were sent through an amplifier and heard through the speaker as speech or a recognizable word.

Applications of Speech Synthesis

In the field of computer technology alone, there is tremendous potential for the use of speech output. Through voice synthesis, applications can expand into areas formerly closed.

In many cases, a blind person who wishes to use a computer must rely on a sighted person to relay information from a video display or printer. To eliminate this dependency, a terminal for the blind can be built to incorporate voice synthesis. Several such terminals are beginning to appear on the market.

Another area where computers are presently ineffective is in interfacing with the non-reading population. They are the prime candidates for using CAI (computer-aided instruction) as a supplement to their education, a good example of this is the Texas Instrument's Speak-and-Spell teaching aid.

Another situation where speech output is desirable is a warehousing/dispatching system. It is not often cost effective to place terminals around a large warehouse to list pending tasks. A better method is speech output from a computer connected to a radio link, which dispatches a worker carrying a pocket receiver/transmitter. Similar systems are in use or under development today.

A stand-alone speech system can be used as a communicator for the verbally impaired. A battery-operated microcomputer system and a speech synthesizer can provide a voice for individuals stricken with neurological or physical disorders which impair the human speech mechanism.

Other applications for voice synthesis are in the area of entertainment electronics. Talking card games, chess games, video games, talking alarm clocks, and now the applications are even extending to the automobile industry. The driver can be warned of engine failure, gas status, oil status, seat belts, brake fluid, pressure failure, and as you can see, there is no limit to the applications in the automobile industry.

Conclusion

The chart below shows the growth of the speech input/output market.

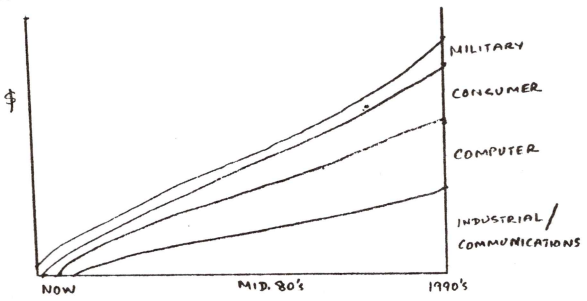

FIGURE 3

During the latter half of the decade, algorithmic and fast signal-processing chip breakthrough will provide the foundation for practical systems that can listen as well as speak. Industrial/telecommunication and computer products will supply the original volume and interest needed to spur on the cost-sensitive consumer-product sector. Meanwhile, military applications will grow slowly but steadily.

The US market for speech synthesis products was approximately $16 million in 1982 and is expected to be $48 million in 1984 and $237 million in 1987.

The interface of man-to-machine will provide a challenge for the 1980's. Speech synthesis will play an important role in the future of computer technology.

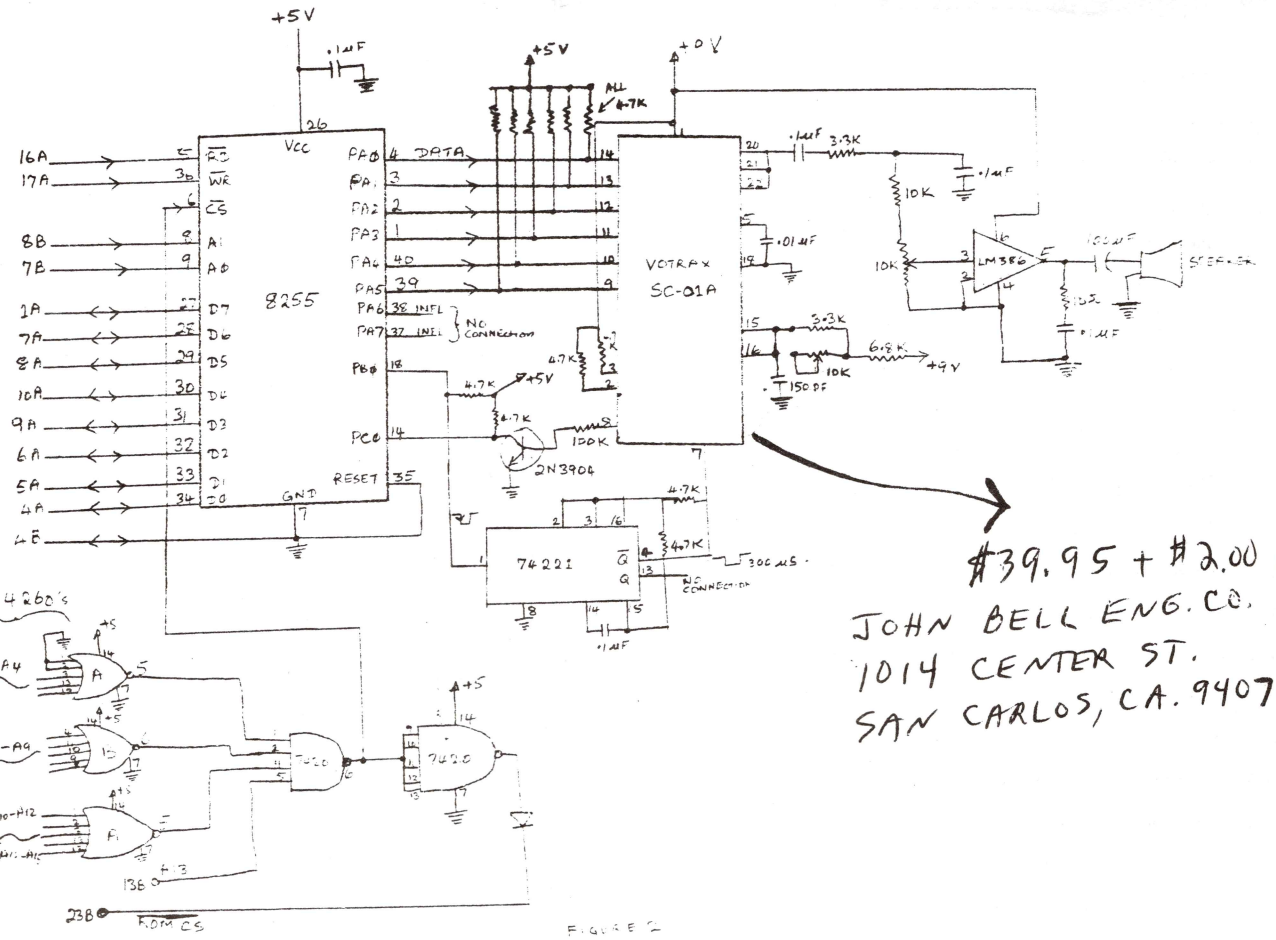

FIGURE 2

$39.95 + $2.00 POST.
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USING Z-XLR8 WITH 32K - BY BILL HARRIS - K5MIL

HAVING SEVERAL LARGE PROGRAMS REQUIRING 16K OR MORE OF RAM, I WAS VERY INTERESTED IN THE Z-XLR8 FAST LOAD/SAVE PROGRAM ADVERTISE IN QZX. I SENT ADVANCED INTERFACE DESIGNS CHECK AND PROMPTLY RECEIVED THE CASSETTE VERSION.

THE PROGRAM WORKS VERY WELL AND THE CALCULATION PROGRAM, WHICH ALLOWS ONE TO SET THE LOAD/SAVE DATA RATE BEST SUITED TO THE RECORDING EQUIPTMENT, IS A VERY NICE FEATURE. THE ONLY DRAWBACK IS THE INABILITY TO RELOCATE Z-XLR8 ABOVE ADDRESS 32K TO USE WITH PROGRAMS WHICH REQUIRE MORE THAN 16K OF RAM. I HAVE SEVERAL PROGRAMS WHICH REQURE MORE THAN 16K AND ONE WHICH EVEN GOES BEYOND 32K. NEEDLESS TO SAY THESE TAKE QUITE A WHILE TO LOAD AND SAVE.

AFTER SOME THOUGHT AND INVESTIGATION, I FOUND A WAY TO MAKE Z-XLR8 WORK WITH THESE LARGE PROGRAMS AND A PROGRAM THAT USED TO TAKE 10 MINUTES TO LOAD NOW TAKES LESS THAN 2 MINUTES. QUTE AN IMPROVEMENT TO SAY THE LEAST. THE PROCESS TO ADD Z-XLR8 TO AN EXISTING PROGRAM IS QUITE LENGHTY, BUT WELL WORTH THE EFFORT TO BE ABLE TO FAST LOAD.

SINCE Z-XLR8 CANNOT BE USED ABOVE ADDRESS 32000, THEN WE MUST FIND A WAY TO USE IT IN THE REM STATEMENT AT 16509. THE PROBLEM IS IF YOU CALL Z-XLR8 FROM THIS LOCATION TO LOAD A PROGRAM, THE PROGRAM BEING LOADED WILL OVERLAY THE Z-XLR8 MACHINE CODE AND CRASH THE SYSTEM.

THE SOLUTION IS TO INCLUDE THE Z-XLR8 MACHINE CODE IN A REM STATEMENT AT THE BEGINNING OF YOUR PROGRAM. THEN WHEN LOADING, Z-XLR8 WILL BE OVERLAYING ITSELF WITH ITS OWN CODE, AND SO THE DATA DOES NOT GET CHANGED.

THE BASIC STEPS TO ACHEIVE THIS ARE:
1) LOAD AND MOVE Z-XLR8 ABOVE RAMTOP.
2) LOAD YOUR PROGRAM.
3) GENERATE A 2,315 BYTE REM STATEMENT TO HOLD THE Z-XLR8 MACHINE CODE.
4) MOVE THE MACHINE CODE FROM ABOVE RAMTOP TO THE REM STATEMENT.
5) SAVE YOUR PROGRAM USING Z-XLR8.
6) FINISHED - NOW YOU CAN SAVE AND LOAD THAT 16K+ PROGRAM USING Z-XLR8.

NOW THE DETAILS:
(ASSUMING 32K OF RAM)
1) SET RAMTOP TO 46,151 (POKE 16388,71 - POKE 16389,180 - NEW - ENTER).
2) LOAD Z-XLR8.
3) INPUT PREVIOUSLY CALCUATED TIMING AND CALABRATION VALUES.
4) ENTER 0 IN RESPONSE TO "INPUT STARTING LOCATION".
5) ADD THE FOLLOWING STATEMENTS.

```
9100 LET A=46152
9105 FOR N=16509 TO 18826
9110 POKE A, PEEK N
9120 LET A=A+1
9130 NEXT N
9140 STOP
```

MAKE SURE THE COMPUTER IS IN FAST MODE AND TYPE GOTO 9100 (ENTER).

THIS WILL TRANSFER THE MACHINE CODE TO ABOVE RAMTOP WHERE IT WILL BE PROTECTED FROM SAVES AND LOADS. THE PROGRAM WILL FINISH WITH A STOP CODE OF 9/9140.

7) LOAD YOUR PROGRAM (REMEMBER YOU HAVE 3K LESS BYTES OF RAM THAN BEFORE-SEE HINT NO. 5).
8) ADD THE FOLLOWING STATEMENTS TO YOUR PROGRAM. THIS WILL GENERATE THE 2,315 BYTE REM STATEMENT WE NEED FOR THE Z-XLR8 MACHINE CODE(YOU MAY HAVE TO RENUMBER SOME OF THE BEGINNING STATEMENTS OF YOUR PROGRM).

```
  1 REM------------------------- (26 SPACES)
  2 REM
  3 PRINT "ENTER NO. OF BYTES NEEDED"
  4 INPUT LL
  5 LET LL=LL-2
  6 LET AA=INT (LL/256)
  7 POKE 16516,AA
  8 LET AA=LL-(AA*256)
  9 POKE 16515,AA
 10 FAST
 11 RAND USR 16514
```

POKE THE FOLLOWING LOCATIONS:

LOC	DATA
16514	1 (SEE HINT 4
16515	1 ON NEXT PAGE)
16516	1
16517	197
16518	33
16519	162
16520	64
16521	62
16522	0
16523	205
16524	38
16525	5
16526	193
16527	42
16528	159
16529	64
16530	35
16531	34
16532	159
16533	64
16534	11
16535	120
16536	177
16537	32
16538	234
16539	201

VARIFY THE STATEMENTS AND DATA
9) TYPE GOTO 3 (ENTER).
10) ENTER THE NUMBER OF BYTES NEEDED (2315).
11) THE SCREEN WILL BLANK AND THE PROGRAM WILL GENERATE A 2,315 BYTE REM STATEMENT. BE PATIENT, IT TAKES A FEW MINUTES. THE PROGRAM WILL DISPLAY CODE 0/0 OR C/0 WHEN FINISHED.
12) TYPE LIST (ENTER).
13) DELETE LINE 1 THEN TYPE 3 REM(ENTER). NOW DELETE LINES 4 THROUGH 11 (DO NOT DELETE LINE 2).
14) TO TRANSFER THE Z-XLR8 CODE TO THE REM STATEMENT, ADD THE FOLLOWING LINES.

```
 9990 FAST
 9991 LET AA=46157
 9992 FOR N=16514 TO 18826
```

```
  9993 POKE N, PEEK AA
  9994 LET AA=AA+1
  9995 NEXT N
  9996 STOP
```

15) TYPE GOTO 9990 (ENTER).

THE Z-XLR8 MACHINE CODE WILL NOW BE TRANSFERRED TO THE REM STATEMENT. THE PROGRAM WILL STOP WITH 9/9996 WHEN FINISHED.

16) TYPE LIST (ENTER) AND VERIFY THAT THE REM STATEMENT CONTAINS THE MACHINE CODE.

17) POKE 16510,1

THIS CHANGES THE NUMBER OF THE REM STATEMENT FROM 2 TO 1.

18) DELETE LINES 9990 THROUGH 9996.

19) CALL Z-XLR8 (TYPE RAND USR 16515).

20) SAVE YOUR PROGRAM USING Z-XLR8 (DO NOT RECORD OVER YOUR ORGINIAL PROGRAM, ALWAYS KEEP A MASTER COPY FOR BACK-UP PURPOSES).

21) TO FAST LOAD YOUR MODIFIED PROGRAM:

A. LOAD Z-XLR8.

B. ENTER TIMING AND CALIBRATION VALUES.

C. ENTER 0 FOR THE STARTING LOCATION (THE PROGRAM WILL STOP WITH 9/9023 DISPLAYED).

D. CALL Z-XLR8 (TYPE RAND USR 16515).

E. PLACE YOUR PROGRAM TAPE IN THE RECORDER, FOLLOW THE PROMPTS, AND YOUR PROGRAM SHOULD FAST LOAD.

HINTS:

1) AFTER YOU HAVE ADDED THE 2,315 BYTE REM STATEMENT TO YOUR PROGRAM, THIS WOULD BE A GOOD TIME TO DO A "REGULAR" SAVE. IF THE SYSTEM SHOULD CRASH FOR ANY REASON FROM THAT POINT ON, YOU WOULD NOT HAVE TO START OVER FROM THE BEGINNING.

2) IF YOU HAVE A STATEMENT IN YOUR PROGRAM THAT CALLS THE REGULAR SAVE ROUTINE, CHANGE IT TO CALL Z-XLR8.

EXAMPLE: 1000 SAVE "(PROG NAME)"

CHANGE TO: 1000 RAND USR 16515

3) YOU MAY NEED TO CHANGE THE NAMES OF THE VARIABLES USED IN THE ROUTINES IN THIS PROCEDURE SO AS NOT TO CONFLICT WITH ANY IN YOUR PROGRAM.

4) THE FOLLOWING PROGRAM WILL SPEED THE ENTERING OF THE DATA FOR THE REM GENERATOR PROGRAM.

```
  9990 FAST
  9991 FOR N=16514 TO 16539
  9992 INPUT AA
  9993 POKE N,AA
  9994 PRINT N, PEEK N
  9995 NEXT N
  9996 STOP
```

THE LOCATION AND DATA WILL BE DISPLAYED AS YOU ENTER IT FOR VARIFICATION PURPOSES. THE PROGRAM WILL STOP (5/9994) WHEN THE PRINT LINE REACHES THE BOTTOM. TYPE C (CONT) TO CONTINUE. WHEN FINISHED DELETE 9990-9996

5) THE 3K OF RAM WE RESERVED ABOVE RAMTOP FOR TEMPORARY STORAGE OF THE MACHINE CODE, PLUS THE 2,315 BYTE REM STATEMENT ADDED TO YOUR PROGRAM, MEANS THERE IS APPROXIMATELY 5K LESS RAM AVAILABLE THAN BEFORE. SO YOUR PROGRAM MUST BE ABLE TO FIT IN 27K OF RAM.

Worked All States

by

Bob Lees, W3ZQN

Here's another excellent article from Bob, complete with documentation and he's even offering to sell copies of it on tape.

Loaded Dipole Design Program

by

Murray Gordon, VE1BRA

I seem to have lost any comments or documentation on this program, if it was sent! The program is self-explanatory from its title and looks well written.

QSL Printing Program

by

Kraig Pritts, KA2LHO

HERE IS A COMPACT QSL PRINTING PROGRAM WHICH MAY BE HANDY IN THE HAM-SHACK. IT IS SUITABLE FOR ANY SITUATION WHERE THE USERS CALL IS FIVE CHARACTERS LESS. LONG CALLS SUCH AS MY WILL NOT WORK (WHICH IS WHY I HAD TO BORROW THE CALL OF OUR PUBLISHER FOR THE SAMPLE).

THE ROUTINE WILL FIT INTO 2K OF RAM BUT I AM NOT SURE THAT IT WILL RUN IN 1K. ALL INFORMATION CAN BE EASILY MODIFIED TO SUIT YOUR INDIVIDUAL TASTES IN INFO AND QSL FORMAT (AS SHOWN IN THE SAMPLE). I HAVE INCLUDED A VARIABLE ASSIGNMENT LIST AS WELL AS A PROGRAM LAYOUT TO ASSIST IN POSSIBLE MODIFICATIONS.

Direction Finding Program

by

George Paczolt, N3CHT

George says this is a slight rewrite of the usual direction finding programs, which provide antenna pointing information for locations having a known long/lat. It also tells sailors which way to 'set sail' and how far they gotta float to reach far away places.

"WAS" PROGRAM

BY BOB LEES, W3ZQN

JUNE, 1983

THIS 16K PROGRAM, WRITTEN IN TIMEX/SINCLAIR BASIC, PROVIDES A CONVENIENT WAY TO STORE DATA RELATED TO THE ARRL WORKED ALL STATES AWARDS. IT IS SELF-PROMPTING AND SHOULD BE EASY TO USE NO MATTER HOW LONG SINCE THE LAST UPDATE. IT TRACKS CONTACTS, QSLS SENT AND QSLS RECEIVED FOR THE 50 STATES FOR SSB, CW AND MIXED MODES AS WELL AS FOR THE 80, 40, 20, 15 AND 10 METER BANDS. IT PERMITS REVIEW OF DATA ON A PER-STATE BASIS AND GENERATES, FOR ANY PARTICULAR BAND OR MODE, A LIST OF STATES WORKED, STATES NOT WORKED AND STATES WORKED BUT FOR WHICH NO QSL HAS BEEN RECEIVED. IT ALSO GENERATES TOTALS FOR THE MODES/BANDS OF STATES WORKED, QSLS SENT AND RECEIVED. THIS PROGRAM HAS A LOAD/SAVE TIME OF ABOUT FOUR-AND-ONE-HALF MINUTES.

ONE CAUTION: ONCE YOU HAVE DATA IN THIS PROGRAM NEVER USE THE "RUN" OR "CLEAR" COMMANDS. THESE WILL WIPE OUT ALL DATA. START THE PROGRAM BY ENTERING "GOTO 100". SAVE IT ALONG WITH DATA BY ENTERING "GOTO 9000". IN ORDER TO HELP AVOID THIS PITFALL, THE PROGRAM STARTS ITSELF AFTER COMPLETION OF A "LOAD" OR "SAVE". THE ONLY TIME YOU MUST REMEMBER TO ENTER "GOTO 100" IS WHEN YOU HAVE THE LISTING ON THE SCREEN AND WANT TO GET THE PROGRAM GOING AGAIN WITHOUT FIRST EXECUTING A "SAVE".

DATA FORMAT

DATA IS STORED IN STRING ARRAYS AS FOLLOWS:

N$(50,2) - THIS ARRAY STORES THE TWO LETTER STATE ABBREVIATIONS RECOMMENDED BY THE U.S. POSTAL SERVICE. THESE ARE SHOWN IN FIGURE 1. THEY ARE LOADED INTO THE ARRAY USING TEMPORARY PROGRAM LINES THAT ARE LATER DELETED, INASMUCH AS THE CONTENTS OF THE ARRAY SHOULD NEVER HAVE TO BE CHANGED.

S$(50,5) - THIS ARRAY STORES SSB DATA FOR THE 50 STATES IN MMYYS/R FORMAT. M = MONTH WORKED (2 DIGITS). Y = YEAR WORKED (2 DIGITS). S/R = QSL (S)ENT OR (R)ECEIVED (1 CHARACTER). IF A QSL HAS NEITHER BEEN SENT NOR RECEIVED THE FIFTH SPACE IS LEFT BLANK. IF THE STATE HAS NOT BEEN WORKED ON SSB THEN THE ENTIRE DATA ELEMENT REMAINS BLANK.

THE FOLLOWING ARRAYS ARE SET UP THE SAME AS S$, BUT ARE FOR THE OTHER MODES/BANDS:

C$ - CW DATA E$ - 80M DATA
F$ - 40M DATA T$ - 20M DATA
I$ - 15M DATA H$ - 10M DATA

(THERE IS NO SPECIFIC ARRAY FOR THE MIXED MODE; THIS INFORMATION IS DERIVED FROM THE SSB AND CW ARRAYS.)

ARRAY B$(8,3) CONTAINS THE NAMES OF THE MODES/BANDS FOR USE IN PRINTING THE VARIOUS REPORTS AS FOLLOWS:

```
B$(1)="SSB"    B$(2)="CW "
B$(3)="80M"    B$(4)="40M"
B$(5)="20M"    B$(6)="15M"
B$(7)="10M"    B$(8)="MIX"
```

AS WITH THE STATE ABBREVIATIONS, THE CONTENTS OF B$ ARE LOADED INTO THE ARRAY WITH TEMPORARY PROGRAM LINES THAT ARE DESCRIBED BELOW UNDER "INITIAL DATA ENTRY".

ARRAYS X$(50,5) AND Y$(50,5) ARE DUMMY ARRAYS USED WITHIN THE PROGRAM FOR TEMPORARY STORAGE AND MANIPULATION OF DATA.

INITIAL DATA ENTRY

AFTER INPUT OF THE "WAS" PROGRAM LISTING, INPUT THE FOLLOWING TEMPORARY PROGRAM STATEMENTS:

```
81 FOR N=1 TO 50
82 INPUT N$(N)
83 PRINT N$(N);"  ";
84 NEXT N
85 PRINT
86 PRINT "STATES COMPLETE"
87 PRINT
88 FOR N=1 TO 8
89 INPUT B$(N)
90 PRINT B$(N);" ";
91 NEXT N
92 PRINT
93 PRINT "MODE/BAND COMPLETE"
94 STOP
```

NOW EXECUTE A "RUN" COMMAND. (THIS IS THE ONLY TIME YOU WILL USE A "RUN". THIS RESERVES SPACE IN MEMORY FOR THE CONTENTS OF THE STRING ARRAYS.)

THE COMPUTER WILL CALL FOR A STRING INPUT (ACTUALLY N$(1)). ENTER THE FIRST STATE ABBREVIATION SHOWN ON FIGURE 1 (AL). CONTINUE THROUGH ALL 50 STATES ON THE FIGURE FROM LEFT TO RIGHT, TOP TO BOTTOM. THE SCREEN WILL DISPLAY WHAT YOU HAVE ENTERED AND WILL TELL YOU WHEN ALL 50 ARE COMPLETE. THEN IT WILL CALL FOR THE 5$ STRING ARRAY INPUTS. ENTER THEM ONE AT A TIME IN THE FOLLOWING ORDER: "SSB", "CW ", "80M", "40M", "20M", "15M", "10M" AND "MIX".

IF YOU FIND YOU MADE A MISTAKE IN ANY N$ OR B$ ELEMENT, CORRECT IT VIA A DIRECT ENTRY OF THAT PARTICULAR ELEMENT. FOR EXAMPLE, SUPPOSE YOU INCORRECTLY ENTERED "49M" FOR THE FOURTH ELEMENT IN B$. CORRECT THIS BY ENTERING THE UNNUMBERED STATEMENT: LET B$(4) = "40M".

ONCE YOU ARE SATISFIED THAT STRING ARRAYS N$ AND B$ WILL NOT HAVE TO BE REDONE, DELETE THE TEMPORARY PROGRAM LINES (81 THROUGH 94). "WAS" IS NOW READY FOR USE. ENTER "GOTO 100" AND THE TITLE SCREEN PLUS MENU OF OPTIONS WILL APPEAR. THIS IS SHOWN IN FIGURE 2.

USING "WAS"

THE MENU OF PROGRAM OPTIONS IS "WAS"S HOME BASE. IT ALWAYS RETURNS TO THE MENU UPON EXITING ANY ROUTINE. HERE ARE DETAILS ABOUT THE OPTIONS:

DISPLAY DATA BY STATE

WHEN SELECTED BY USING THE "D" KEY, THIS ROUTINE WILL FIRST ASK WHAT STATE YOU CHOOSE. ENTER THE TWO LETTER ABBREVIATION. THE PROGRAM WILL DISPLAY THE DATA FOR ALL MODES/BANDS FOR THAT STATE. FIGURE 3 SHOWS MY DATA FOR MY HOME STATE (PA). TO DISPLAY ANOTHER STATE ANSWER THE "ANOTHER?" QUESTION WITH A (Y)ES. A (N)O WILL RETURN YOU TO THE MENU. IF YOU TRY A NONEXISTANT ABBREVIATION YOU WILL BE TOLD AND ASKED WHETHER YOU WISH TO TRY AGAIN.

CHANGE DATA

THIS ROUTINE, SELECTED BY THE "C" KEY, ALSO DISPLAYS STATE DATA, BUT IT PERMITS CHANGING THAT DATA BY RESPONDING TO A QUESTION AS SHOWN IN FIGURE 4. ENTER THE DIGIT CORRESPONDING TO THE MODE/BAND TO BE CHANGED AND THE COMPUTER WILL ASK FOR A STRING INPUT. ENTER THE FIVE CHARACTERS (MMYYS/R). CONTINUE ANSWERING THE ON-SCREEN QUESTIONS (MORE DATA THIS STATE?, ANOTHER STATE?) WITH EITHER (Y)ES OR (N)O. SUCCESSIVE (N)O ANSWERS WILL RETURN THE MENU.

USE THIS ROUTINE TO ENTER THE INFORMATION FROM YOUR LOG OR QSL CARD FILE. IT IS NECESSARY TO ENTER DATA SEPARATELY FOR BOTH MODE AND BAND AS ILLUSTRATED BY THIS EXAMPLE:

SUPPOSE YOU FIRST WORKED IDAHO DURING NOVEMBER, 1980 ON 20 METERS CW AND YOU HAVE THAT QSL. FOR "ID" YOU WOULD ENTER "1180R" IN BOTH THE CW AND THE 20M DATA ELEMENTS. IF YOU ALSO WORKED IDAHO ON 15M CW DURING MAY, 1981 AND SENT A QSL, BUT HAVE NOT RECEIVED ONE, ENTER "05815" FOR THE 15M DATA. A DECEMBER, 1982 CONTACT ON 10M, WHERE YOU HAVE NOT SENT A CARD BECAUSE OF NO CALLBOOK LISTING WOULD BE ENTERED AS "1282". FIGURE 5 SHOWS THE "ID" DISPLAY AFTER ENTERING THE ABOVE DATA.

TOTALS

THIS ROUTINE IS SELECTED VIA THE "T" KEY. AFTER COUNTING FOR ABOUT 18 SECONDS, DURING WHICH THE SCREEN IS BLANK, A DISPLAY SIMILAR TO FIGURE 6 WILL APPEAR. THIS FIGURE IS FROM MY OWN DATA. YOU CAN TELL AT A GLANCE THAT MY HAMMING IS NEARLY ALL ON CW.

STATES WORKED, NOT WORKED

THE "S" KEY SELECTS THIS OPTION. AFTER ENTERING THE DIGIT FOR THE MODE OR BAND DESIRED, THE COMPUTER WILL SEARCH FOR ABOUT 13 SECONDS AND THEN DISPLAY SOMETHING LIKE FIGURE 7. THIS IS MY 40M DATA, AND YOU CAN SEE THAT I HAVE A WAY TO GO FOR WORKED ALL STATES ON 40.

LIST STATE ABBREVIATIONS

THE "A" KEY RESULTS IN A PRINT OF THE N$ ARRAY AS SHOWN IN FIGURE 1. THIS IS HELPFUL IF YOU FORGET WHICH TWO LETTERS WERE USED AS THE ABBREVIATION FOR A PARTICULAR STATE.

EXIT

TOUCHING THE "E" KEY ALLOWS SAVING OR LISTING THE PROGRAM AND GIVES A REMINDER TO USE "GOTO 100" TO START THE PROGRAM AGAIN AND USE "GOTO 9000" TO SAVE IT WITH DATA.

FINAL THOUGHTS

I HOPE YOU WILL TRY "WAS" AND IMPROVE IT. PERHAPS SOME WILL WANT TO ADD OTHER WORKED ALL STATES CATEGORIES SUCH AS RTTY OR 75 METER 2 LETTER EXTRA CLASS.

FOR ANY INTERESTED, I CAN SUPPLY A "WAS" PROGRAM PACKAGE. IT WILL CONTAIN TWO COPIES OF THE PROGRAM, INCLUDING THE N$ AND B$ DATA, ON OPPOSITE SIDES OF A C-20 CASSETTE. ALSO INCLUDED WILL BE A HARD COPY OF THIS ARTICLE INCLUDING THE PROGRAM LISTING. THE PRICE IS $10.00 VIA CHECK OR MONEY ORDER TO: 705 JONATHAN ROAD, KING OF PRUSSIA, PA. 19406. ORDERS VIA CHECK WILL BE HELD FOR THREE WEEKS TO PERMIT THE CHECK TO CLEAR. YOUR CASSETTE WILL HAVE BEEN CHECKED FOR PROPER OPERATION ON MY SYSTEM BUT I CANNOT OFFER A REFUND IF IT FAILS TO WORK ON YOURS.

(THIS ARTICLE WAS PREPARED ON THE TIMEX/SINCLAIR 2040 PRINTER USING MY "TYPE" PROGRAM. CASSETTE/LISTING/DOCUMENTATION IS AVAILABLE FOR $6.00. SAME ADDRESS AND TERMS AS ABOVE.)

FIGURE 1

STATE ABBREVIATIONS USED:

AL	AK	AZ	AR	CA	CO	CT	DE
FL	GA	HI	ID	IL	IN	IA	KS
KY	LA	ME	MD	MA	MI	MN	MS
MO	MT	NB	NV	NH	NJ	NM	NY
NC	ND	OH	OK	OR	PA	RI	SC
SD	TN	TX	UT	VT	VA	WA	WV
WI	WY						

FIGURE 2

```
          PROGRAM "WAS"
PROG. BY W3IQN, R.J. LEE3, 04/83
TO RUN USE  GOTO 100
TO SAVE USE  GOTO 9000
IF  FUN  USED  ALL DATA IS LOST
```

050/QSL DATA IS STORED FOR THE 50 STATES. EACH STATE HAS DATA FOR MIXED, SSB, CW, 80, 40, 20, 15, AND 10 METERS. DATA IS IN THE FORMAT MMYYS/R WHERE:
M = MONTH Y = YEAR
S = QSL SENT R = QSL RECEIVED

```
ENTER ROUTINE DESIRED
```

D - DISPLAY DATA BY STATE
C - CHANGE DATA
T - TOTALS WORKED, SENT, REC.
S - STATES WORKED, NOT WORKED
A - LIST STATE ABBREVIATIONS
E - EXIT THE PROGRAM

FIGURE 3

```
PA    SSB   CW    80    40
      1063R 0155R 0357R 0155R

            20    15    10
            0558R 1180R 0758R
```

FIGURE 4

```
PA    SSB   CW    80    40
      1063R 0155R 0357R 0155R

            20    15    10
            0558R 1180R 0758R

WHICH DATA CHANGES? ENTER NO.

1 - SSB          2 - CW
3 - 80           4 - 40
5 - 20           6 - 15
7 - 10           0 - TO EXIT
```

FIGURE 5

```
ID   SSB   CW    80    40
           1180R

           20    15    10
           1180R 0581S 1282
```

FIGURE 6

"WAS" TOTALS

	WORKED	QSL R	QSL S/NR
MIXED	50	50	0
SSB	14	14	0
CW	50	50	0
80	31	28	3
40	33	31	3
20	43	42	1
15	23	17	4
10	31	19	10

FIGURE 7

```
40M

AL  CA  CT  DE  FL  GA  IL  IN
IA  KS  KY  LA  ME  MD  MA  MI
MO  NH  NJ  NY  NC  ND  OH  OK
PA  RI  SC  TN  TX  VT  VA  WV
WI
33 STATES WORKED

AK  AZ  AR  CO  HI  ID  MN  MS
MT  NB  NV  NM  OR  SD  UT  WA
WY
17 STATES NOT WORKED

KS  RI
2 STATES WORKED BUT NO QSL
```

"WAS" PROGRAM LISTING

```
  1 REM PROGRAM "WAS" BY R.J.
LEE3- 705 JONATHAN RD., KING OF
PRUSSIA, PA. 19406.  NOTE: THIS
PROGRAM CONTAINS 2 LETTER STATE
ABBREVIATIONS IN STRING ARRAY
N$().  IT CONTAINS BAND/MODE
NAMES IN ARRAY B$.  IF "RUN"
HAS BEEN USED BY MISTAKE ALL
THIS DATA WILL BE GONE.  YOU
WILL HAVE TO REINSERT IT
MANUALLY OR BY USING A TEMPORARY
PROGRAM.
  70 DIM N$(50,2)
  71 DIM S$(50,5)
  72 DIM C$(50,5)
  73 DIM E$(50,5)
  74 DIM F$(50,5)
  75 DIM T$(50,5)
  76 DIM I$(50,5)
  77 DIM H$(50,5)
  78 DIM B$(8,3)
  79 DIM X$(50,5)
  80 DIM Y$(50,5)
```

TITLE SCREEN

```
 100 PRINT TAB 8;"PROGRAM ""WAS""
""
 101 PRINT "PROG. BY W3IQN, R.J.
LEE3, 04/83"
 102 PRINT "TO RUN USE  GOTO 100
TO SAVE USE  GOTO 90
IF  FUN  USED  ALL
DATA IS LOST"
 103 PRINT
 104 PRINT "050/QSL DATA IS STOR
ED FOR THE  50 STATES.  EACH ST
ATE HAS DATAFOR MIXED, SSB, CW,
80, 40, 20, 15, AND 10 METERS.
 DATA IS IN THE FORMAT MMYYS/R W
HERE:"
 105 PRINT " M = MONTH","Y = YEA
R"
 106 PRINT " S = QSL SENT","R =
QSL RECEIVED"
 107 PRINT
```

MENU

```
 130 PRINT "ENTER ROUTINE DESIRE
D"
 140 GOSUB 3000
```

MENU SELECT

```
 150 IF INKEY$="D" THEN GOTO 100
0
 160 IF INKEY$="C" THEN GOTO 200
0
 170 IF INKEY$="T" THEN GOTO 300
0
 180 IF INKEY$="S" THEN GOTO 400
0
 185 IF INKEY$="A" THEN GOTO 500
0
 186 IF INKEY$="E" THEN GOTO 700
0
 190 GOTO 130
```

DISPLAY DATA BY STATE ROUTINE

```
1000 GOSUB 5000
1090 PRINT AT 18,0;"ANOTHER?
";
1100 GOSUB 3000
1110 IF INKEY$="Y" THEN GOTO 100
0
1120 IF INKEY$="N" THEN GOTO 130
1130 GOTO 1090
```

CHANGE DATA ROUTINE

```
2000 GOSUB 5000
2010 PRINT
2030 PRINT "WHICH DATA CHANGES?
(0=EXIT)","{{
2040 PRINT "1 - SSB","2 - CW","3
 - 80","4 - 40","5 - 20","6 - 15
","7 - 10","0 - TO EXIT"
2050 INPUT A
2060 PRINT
2065 IF A=0 THEN GOTO 2500
2070 PRINT AT 18,0;"ENTER THE ";
B$(A);" DATA. MM/Y/S/R"
2080 IF A=1 THEN INPUT S$(C)
2082 IF A=2 THEN INPUT C$(C)
2084 IF A=3 THEN INPUT E$(C)
2086 IF A=4 THEN INPUT F$(C)
2088 IF A=5 THEN INPUT T$(C)
2090 IF A=6 THEN INPUT I$(C)
2092 IF A=7 THEN INPUT H$(C)
2096 CLS
2100 GOSUB 5120
2110 PRINT
2120 PRINT AT 18,0;"MORE DATA FO
R THIS STATE?
";
2130 GOSUB 3000
2135 IF INKEY$="N" THEN GOTO 217
0
2140 IF INKEY$="Y" THEN GOSUB 61
20
2145 GOTO 2010
2160 GOTO 2130
2170 CLS
2180 PRINT AT 18,0;"ANOTHER STAT
E?
";
2190 GOSUB 3000
```

TOTALS ROUTINE

```
2200 IF INKEY$="Y" THEN GOTO 200
0
2210 IF INKEY$="N" THEN GOTO 130
2220 GOTO 2180
2500 CLS
2510 GOTO 130
3000 CLS
3010 LET SW=0
3011 LET SS=0
3012 LET SR=0
3013 LET CW=0
3014 LET CS=0
3015 LET CR=0
3016 LET EW=0
3017 LET ES=0
3018 LET ER=0
3019 LET FW=0
3020 LET FS=0
3021 LET FR=0
3022 LET TW=0
3023 LET TS=0
3024 LET TR=0
3025 LET IW=0
3026 LET IS=0
3027 LET IR=0
3028 LET HW=0
3029 LET HS=0
3030 LET HR=0
3031 LET MW=0
3032 LET MS=0
3033 LET MR=0
3040 FOR N=1 TO 50
3050 IF S$(N,1)<>" " THEN LET SW
=SW+1
3052 IF S$(N,5)="S" THEN LET SS=
SS+1
3054 IF S$(N,5)="R" THEN LET SR=
SR+1
3056 IF C$(N,1)<>" " THEN LET CW
=CW+1
3058 IF C$(N,5)="S" THEN LET CS=
CS+1
3060 IF C$(N,5)="R" THEN LET CR=
CR+1
3062 IF E$(N,1)<>" " THEN LET EW
=EW+1
3064 IF E$(N,5)="S" THEN LET ES=
ES+1
3066 IF E$(N,5)="R" THEN LET ER=
ER+1
3068 IF F$(N,1)<>" " THEN LET FW
=FW+1
3070 IF F$(N,5)="S" THEN LET FS=
FS+1
3072 IF F$(N,5)="R" THEN LET FR=
FR+1
3074 IF T$(N,1)<>" " THEN LET TW
=TW+1
3076 IF T$(N,5)="S" THEN LET TS=
TS+1
3078 IF T$(N,5)="R" THEN LET TR=
TR+1
3080 IF I$(N,1)<>" " THEN LET IW
=IW+1
3082 IF I$(N,5)="S" THEN LET IS=
IS+1
3084 IF I$(N,5)="R" THEN LET IR=
IR+1
3086 IF H$(N,1)<>" " THEN LET HW
=HW+1
3088 IF H$(N,5)="S" THEN LET HS=
HS+1
3090 IF H$(N,5)="R" THEN LET HR=
HR+1
3092 IF S$(N,1)<>" " OR C$(N,1)<
>" " THEN LET MW=MW+1
3094 IF S$(N,5)="S" OR C$(N,5)="
S" THEN LET MS=MS+1
3096 IF S$(N,5)="R" OR C$(N,5)="
R" THEN LET MR=MR+1
3100 NEXT N
3110 PRINT TAB 5;"+ ""WAS"" TOTA
LS +",,,
```

NOTES:
S = SSB
C = CW
E = 80
F = 40
T = 20
I = 15
H = 10
M = MIXED
W = WORKED
S = QSL SENT
R = QSL REC'D

```
3120 PRINT "      WORKED  OSL F
 OSL S/NF"
3130 PRINT "MIXED";;;"SSB";;;;"
CW";;;;"80";;;;"40";;;;"20";;;;"
15";;;;"10"
3140 PRINT ,,"HIT ANY KEY TO SEE
 ";"
3145 PRINT AT 5,9;MW;AT 5,16;MF;
AT 5,23;MS
3150 PRINT AT 7,9;SW;AT 7,16;SF;
AT 7,23;SS
3160 PRINT AT 9,9;CW;AT 9,16;CF;
AT 9,23;CS
3170 PRINT AT 11,9;EW;AT 11,16;E
F;AT 11,23;ES
3180 PRINT AT 13,9;FW;AT 13,16;F
F;AT 13,23;FS
3190 PRINT AT 15,9;TW;AT 15,16;T
F;AT 15,23;TS
3200 PRINT AT 17,9;IW;AT 17,16;I
F;AT 17,23;IS
3210 PRINT AT 19,9;HW;AT 19,16;H
F;AT 19,23;HS
3220 GOSUB 8000
3230 GOTO 2500
4000 CLS
4010 LET XW=0
4020 LET XX=0
4030 PRINT "WHAT BAND/MODE? SHIFT
 4 FOR $"
4040 PRINT
4050 PRINT "1 - SSB","2 - CW","3
 - 80","4 - 40","5 - 20","6 - 15
","7 - 10","8 - MIXED","0 - TO E
XIT"
4060 INPUT A
4070 CLS
4080 IF A<1 OR A>8 THEN GOTO 130
4090 FOR N=1 TO 50
4100 IF A=1 OR A=8 THEN LET X$(N
)=S$(N)
4110 IF A=2 THEN LET X$(N)=C$(N)
4120 IF A=3 THEN LET X$(N)=E$(N)
4130 IF A=4 THEN LET X$(N)=F$(N)
4140 IF A=5 THEN LET X$(N)=T$(N)
4150 IF A=6 THEN LET X$(N)=I$(N)
4160 IF A=7 THEN LET X$(N)=H$(N)
4162 IF A=8 THEN LET Y$(N)=C$(N)
4170 NEXT N
4180 GOSUB 4500
4190 GOSUB 8000
4200 IF INKEY$="N" THEN GOTO 130
4210 IF INKEY$="Y" THEN GOTO 400
0
4220 GOSUB 4750
4230 GOTO 4190
4500 PRINT B$(A)
4510 PRINT
4520 FOR N=1 TO 50
4530 IF A<>8 AND X$(N,1)<>" " TH
EN PRINT N$(N);"  ";
4540 IF A<>8 AND X$(N,1)<>" " TH
EN LET XW=XW+1
4541 IF A<>8 THEN GOTO 4550
4542 IF X$(N,1)<>" " OR Y$(N,1)<
>" " THEN PRINT N$(N);"  ";
4544 IF X$(N,1)<>" " OR Y$(N,1)<
>" " THEN LET XW=XW+1
4550 NEXT N
4560 PRINT
4580 PRINT XW;" STATES WORKED"
4590 PRINT
4600 FOR N=1 TO 50
4610 IF A<>8 AND X$(N,1)=" " THE
N PRINT N$(N);"  ";
4615 IF A=8 AND X$(N,1)=" " AND
Y$(N,1)=" " THEN PRINT N$(N);"
 ";
4620 NEXT N
4630 PRINT
4650 PRINT 50-XW;" STATES NOT WO
RKED"
4660 PRINT
4670 FOR N=1 TO 50
4680 IF A<>8 AND X$(N,1)<>" " AN
D X$(N,5)<>"R" THEN PRINT N$(N);
"  ";
4690 IF A<>8 AND X$(N,1)<>" " AN
D X$(N,5)<>"R" THEN LET XX=XX+1
4691 IF A<>8 THEN GOTO 4700
4692 IF X$(N,1)<>" " AND X$(N,5)
<>"R" THEN GOTO 4695
4693 IF Y$(N,1)<>" " AND Y$(N,5)
<>"R" THEN GOTO 4695
4694 GOTO 4700
4695 PRINT N$(N);"  ";
4696 LET XX=XX+1
4700 NEXT N
4710 PRINT
4730 PRINT XX;" STATES WORKED BU
T NO QSL"
4740 PRINT
4750 PRINT AT 18,0;"ANOTHER? SHI
FT V"
4760 RETURN
5000 CLS
5004 PRINT "STATE ABBREVIATIONS
USED:"
5005 PRINT
5010 FOR N=1 TO 50
5020 PRINT N$(N);"  ";
5030 NEXT N
5040 PRINT AT 20,0;"HIT ANY KEY
 TO BE TOLD"
5050 GOSUB 8000
5060 GOTO 2500
6000 CLS
6010 PRINT AT 18,0;"WHAT STATE?
 ENTER 2 LETTER"
6020 INPUT A$
6030 FOR N=1 TO 50
6040 IF A$=N$(N) THEN GOTO 6105
6050 NEXT N
6060 PRINT
6070 PRINT "WRONG ABBREVIATION."
;"TRY AGAIN? SHIFT Y"
6080 GOSUB 8000
6090 IF INKEY$="Y" THEN GOTO 600
0
6100 IF INKEY$="N" THEN GOTO 130
6101 GOTO 6070
6105 CLS
6110 LET C=N
6120 PRINT N$(C);"   SSB   CW
 80    40"
6130 PRINT
6140 PRINT TAB 5;S$(C);" ";C$(C)
;" ";E$(C);" ";F$(C)
6150 PRINT '''
6160 PRINT TAB 11;"20    15    1
0"
6170 PRINT
6180 PRINT TAB 11;T$(C);" ";I$(C
);" ";H$(C)
6190 RETURN
7000 CLS
7010 PRINT AT 10,0;"YOU HAVE STO
PPED THE PROGRAM. ";"REMEMBER
TO START IT AGAIN USE",TAB 10;""
"GOTO 100"";" TO SAVE IT";TAB 10;
"USE ""GOTO 9000""",TAB 10;"NEVE
R USE ""RUN"" OR ",TAB 10;"DATA
WILL BE LOST"
7020 STOP
8000 SLOW
8010 PAUSE 20
8020 IF INKEY$="" THEN GOTO 8020
8030 FAST
8040 CLS
8050 RETURN
9000 SAVE "USA"
9010 GOTO 100
```

Note: you enter regular "S". Computer will change it to inverse "S".

STATES WORKED / NOT WORKED ROUTINE

TOTALS ROUTINE

PRINT STATE ABBREVIATIONS ROUTINE

DISPLAY DATA BY STATE SUBROUTINE

EXIT MESSAGE

AWAIT KEYBOARD INPUT SUB.

AUTO PROG. START

```
VE1BAA
  10 REM LOADED DIPOLE DESIGN
  15 CLS
  20 PRINT AT 2,6;"LOADED DIPOLE
 DESIGN"
  25 FOR V=1 TO 32
  30 PRINT "=";
  35 NEXT V
  40 PRINT
  45 PRINT AT 5,4;"<----------L-
----------)"
  50 PRINT AT 7,4;"X----()---- -
---()----X"
  55 PRINT AT 8,4;"           + +
 "
  60 PRINT AT 9,4;"           + +
 "
  65 PRINT
  70 PRINT "()=LOADING COIL"
  75 PRINT "X-TO-X DISTANCE=OVER
ALL ANTENNA"
  80 PRINT "LENGTH."
  85 PRINT "THE DIPOLE IS FED IN
 THE CENTER"
  90 PRINT "AND THE FEEDLINE TO
LOADING"
  95 PRINT "COIL DISTANCE IS A V
ARIABLE"
 100 PRINT "YOU WILL INPUT"
 105 PRINT AT 21,7;"PRESS C TO C
ONT."
 110 IF INKEY$="C" THEN GOTO 120
 115 IF INKEY$<>"C" THEN GOTO 11
0
 120 CLS
 125 PRINT TAB 11;"DATA INPUT"
 130 FOR V=1 TO 32
 135 PRINT "-";
 140 NEXT V
 145 PRINT "OPERATING FREQUENCY
IN MHZ?"
 150 INPUT F
 155 PRINT F
 160 LET H=468/F
 165 PRINT "STANDARD 1/2 WAVE DI
POLE IS ";H;" FT"
 170 PRINT
 175 PRINT "CENTER TO LOADING CO
IL DIST(FT)?"
 180 INPUT B
 185 PRINT B
 190 IF B>230/F THEN GOTO 175
 195 PRINT "SPECIFY WIRE GAUGE"
 200 INPUT G1
 205 PRINT G1
 210 IF G1<8 THEN GOTO 195
 215 IF INT (G1/2)=(G1)/2 THEN L
ET G=G1
 220 IF INT (G1/2)<>(G1)/2 THEN
LET G=G1+1
 225 IF G>22 THEN GOTO 195
 230 GOSUB 385
 235 PRINT "OVERALL ANTENNA LENG
TH IN FT"
 240 INPUT L
 245 PRINT L
 250 IF L>465/F THEN PRINT "TOO
 LONG,CAPACITIVE LOADING NEEDED"
 255 IF L>465/F THEN GOTO 235
 260 IF L<2*B THEN PRINT "COILS
ARE OUTSIDE OF ANTENNA"
 265 IF L<2*B THEN GOTO 235
 270 GOSUB 430
 275 PRINT "LOADING COIL IS ";S6
;" MICOHENRYS"
 280 PRINT
 285 PRINT "DO YOU WANT COIL DES
IGN?Y OR N"
 290 IF INKEY$="Y" THEN GOTO 305
 295 IF INKEY$="N" THEN GOTO 310
 300 IF INKEY$<>"N" THEN GOTO 29
0
 305 GOSUB 485
 310 CLS
 315 PRINT AT 4,10;"MENU"
 320 PRINT AT 6,4;"1-COIL DESIGN
"
 325 PRINT AT 7,4;"2-RESTART"
 330 PRINT AT 8,4;"3-EXAMINE EFF
ECT ON VARIABLE"
 335 PRINT AT 9,6;"CHANGES"
 340 PRINT AT 10,4;"4-STOP"
 345 IF INKEY$="1" THEN GOTO 305
 350 IF INKEY$="2" THEN GOTO 15
 355 IF INKEY$="3" THEN GOTO 670
 360 IF INKEY$="4" THEN GOTO 370
 365 IF INKEY$<>"4" THEN GOTO 34
5
 370 STOP
 375 SAVE "DIPOLE DESIG"
 380 GOTO 15
 385 IF G=8 THEN LET D=.129
 390 IF G=10 THEN LET D=.102
 395 IF G=12 THEN LET D=.081
 400 IF G=14 THEN LET D=.064
 405 IF G=16 THEN LET D=.051
 410 IF G=18 THEN LET D=.040
 415 IF G=20 THEN LET D=.032
 420 IF G=22 THEN LET D=.025
 425 RETURN
 430 LET X=((234/F)-B)
 435 LET Y=((L/2)-B)
 440 LET S1=1E6/(68*(PI**2)*(F**
2))
 445 LET S2=1/X*(LN (24*X/D)-1)
 450 LET S3=(1-F*B/234)**2-1
 455 LET S4=1/Y*(LN (24*Y/D)-1)
 460 LET S5=(Y*F/234)**2-1
 465 LET S6=S1*(S2*S3-S4*S5)
 470 RETURN
 475 GOSUB 485
 480 GOTO 670
 485 CLS
 490 PRINT "CURRENT VALUE OF IND
UCTANCE IS "
 495 PRINT S6;" MICROHENRYS"
 500 PRINT
 505 PRINT "DO YOU WANT TO USE T
HIS VALUE IN"
 510 PRINT "DESIGNING A COIL? (Y
OR N)"
 515 IF INKEY$="Y" THEN GOTO 550
 520 IF INKEY$="N" THEN GOTO 530
 525 IF INKEY$<>"N" THEN GOTO 51
5
 530 PRINT "PLEASE ENTER THE NEW
 VALUE IN"
 535 PRINT "MICROHENRYS"
 540 INPUT S6
 545 PRINT S6
 550 PRINT "DIAMETER OF COIL IN
INCHES?"
 555 INPUT A
 560 PRINT A
 565 LET R=A/2
 570 PRINT "NUMBER OF TURNS PER
INCH?"
 575 INPUT T
 580 PRINT T
 585 CLS
 590 FOR V=1 TO 32
 595 PRINT "-";
 600 NEXT V
 605 PRINT " COIL DIAMETER= ";A;"
 INCHES"
 610 PRINT "TURNS/INCH= ";T
 615 LET L1=((10*S6)+SQR ((100*S
6*S6)-(4*R*R*T*T*(-9*R*S6)))/(2
*R*R*T*T)
 620 LET L2=((10*S6)-SQR ((100*S
6*S6)-(4*R*R*T*T*(-9)*R*S6)))/(2
*R*R*T*T)
 625 IF L1>L2 THEN LET L3=L1
 630 IF L2>L1 THEN LET L3=L2
 635 PRINT "COIL LENGTH = ";L3;"
 INCHES"
 640 PRINT "TOTAL TURNS = ";T*L3
 645 PRINT "INDUCTANCE  = ";S6;"
 MICROHENRYS"
 650 PRINT "PRESS C TO CONT."
 655 IF INKEY$="C" THEN GOTO 665
 660 IF INKEY$<>"C" THEN GOTO 65
5
 665 RETURN
 670 CLS
 675 PRINT "TO EXAMINE THE EFFEC
T ON COIL"
 680 PRINT "INDUCTANCE OF CHANGI
NG A "
 685 PRINT "VARIABLE CHOOSE A NU
MBER "
 690 PRINT
 695 PRINT "1-FEED POINT TO COIL
 DISTANCE"
 700 PRINT "2-OVERALL LENGTH"
 705 PRINT "3-WIRE SIZE"
 710 PRINT "4-RETURN FOR NEW DES
IGN"
 715 PRINT "5-RETURN TO COIL DES
IGN"
 720 PRINT "6-STOP"
 725 IF INKEY$="1" THEN GOTO 760
 730 IF INKEY$="2" THEN GOTO 865
 735 IF INKEY$="3" THEN GOTO 960
 740 IF INKEY$="4" THEN GOTO 15
 745 IF INKEY$="5" THEN GOTO 475
 750 IF INKEY$="6" THEN GOTO 370
 755 IF INKEY$<>"6" THEN GOTO 72
5
 760 CLS
 765 PRINT "LOAD CHANGE WITH FEE
DPOINT"
 770 PRINT "TO LOADING COIL DIST
ANCE CHANGE"
 775 PRINT
 780 PRINT "OVERALL LENGTH= ";L;
" FT"
 785 PRINT "RESONANT FREQ.= ";F;
"MHZ"
 790 PRINT "WIRE SIZE= ";G;" GAG
E"
 795 FOR V=1 TO 32
 800 PRINT "-";
 805 NEXT V
 810 PRINT "CENTER TO COIL   IND
UCTANCE"
 815 PRINT "DIST.(FT)        MIC
ROHENRYS"
 820 LET Q=B
 825 FOR B=(.05*L) TO (.45*L) ST
EP (.05*L)
 830 GOSUB 430
 835 PRINT B;TAB 16;S6
 840 NEXT B
 845 LET B=Q
 850 PRINT "PRESS C TO CONT."
 855 IF INKEY$="C" THEN GOTO 670
 860 IF INKEY$<>"C" THEN GOTO 85
5
 865 CLS
 870 PRINT "LOAD CHANGE WITH CHA
NGE IN"
 875 PRINT "OVERALL ANTENNA LENG
H:"
 880 PRINT
 885 PRINT "CENTER TO COIL DIST.
= ";B;" FT"
 890 PRINT "CENTER FREQ.= ";F;"
MHZ"
 895 PRINT "WIRE SIZE= ";G;" GAG
E"
 900 FOR V=1 TO 32
 905 PRINT "-"
 910 NEXT V
 915 LET Q=L
 920 PRINT "TOTAL LENGTH   INDUC
TIVE LOAD"
 925 PRINT "FEET           MICRO
HENRYS"
 930 FOR L=(2.4*B) TO (465/F) ST
EP (((230/F)-(2.4*B))/4)
 935 GOSUB 430
 940 PRINT L;TAB 16;S6
 945 NEXT L
 950 LET L=Q
 955 GOTO 850
 960 CLS
 965 PRINT "CHANGE IN LOAD WITH
CHANGE"
 970 PRINT "IN ANTENNA WIRE SIZE
"
 975 PRINT
 980 PRINT "RESONANT FREQUENCY=
";F;" MHZ"
 985 PRINT "LENGTH-----------=
";L;" FT"
 990 PRINT "CENTER TO COIL DIST=
";B;" FT"
 995 FOR V=1 TO 32
1000 PRINT "-";
1005 NEXT V
1010 PRINT "WIRE SIZE        INDU
CTANCE LOAD"
1015 PRINT "(GAGE)           MICR
OHENRYS"
1020 LET P=G
1025 FOR G=8 TO 22 STEP 2
1030 GOSUB 385
1035 GOSUB 430
1040 PRINT G;TAB 16;S6
1045 NEXT G
1050 LET G=P
1055 GOTO 850
```

```
  1 REM "QSL" PAINTING PROGRAM
  2 GOTO 200
  5 CLS
  7 LET A$="K5XY "
  9 FOR I=1 TO LEN A$
 30 LET P=7688+(CODE (A$(I))-1)
*8
 40 FOR J=0 TO 7
 50 LET ODD=J-INT (J/2)*2
 60 LET A=PEEK (P+J)
 70 FOR K=7 TO 0 STEP -1
 80 LET B=A-2*INT (A/2)
 90 LET A=INT (A/2)
100 IF B=1 THEN PLOT K,NOT ODD
110 NEXT K
120 IF ODD=1 THEN SCROLL
130 NEXT J
140 NEXT I
150 GOTO 500
200 CLS
202 PRINT "CALL? ";
205 INPUT C$
210 PRINT C$
215 PRINT "DATE (M/D/Y)? ";
220 INPUT D$
225 PRINT D$
230 PRINT "TIME (UTC)? ";
235 INPUT T
240 PRINT T;" UTC"
245 PRINT "BAND? ";
250 INPUT B$
255 PRINT B$;" METERS"
260 PRINT "MODE? ";
265 INPUT M$
270 PRINT M$
275 PRINT "HIS/HER REPORT? ";
280 INPUT R
285 PRINT R
290 PRINT "YOUR RIG? ";
295 INPUT Y$
300 PRINT Y$
305 PRINT "YOUR ANTENNA? ";
310 INPUT E$
315 PRINT E$
320 PRINT "COMMENTS==> ";
325 INPUT Z$
330 PRINT Z$
335 PRINT "QSL (""PSE"" OR ""TN
X"")? ";
340 INPUT Q$
345 PRINT Q$
350 GOTO 5
500 PRINT AT 1,9;"RADIO ";C$;"
CONFIRMING"
505 PRINT TAB 9;"OUR QSO OF ";D
$
510 PRINT TAB 9;"AT ";T;" UTC."
512 PRINT
515 PRINT TAB 9;"UR ";B$;" METE
R ";M$
520 PRINT TAB 9;"SIGNALS WERE "
;R;"."
522 PRINT
525 PRINT TAB 9;"RIG HR IS ";Y$
530 PRINT TAB 9;"ES ANT IS ";E$
535 PRINT
540 PRINT TAB 9;Z$
545 PRINT
550 PRINT TAB 9;"QSL ";Q$;" ES
73,"
555 PRINT TAB 23;"ALEX"
560 PRINT AT 17,6;"ALEX F.BURR-
K5XY"
565 PRINT TAB 6;"2025 O""DONNEL
L DRIVE"
570 PRINT TAB 6;"LAS CRUCES, NM
88001"
575 PRINT TAB 6;"DONA ANA COUNT
Y-USA"
580 STOP
```

SAMPLE PRINTOUT

```
K
5
X
Y

RADIO KA2LHO CONFIRMING
OUR QSO OF 04/25/83
AT 2135 UTC.

UR 20 METER SSB
SIGNALS WERE 59.

RIG HR IS KENWOOD 6305
ES ANT IS WILSON BEAM

TNX FOR FB QSO

QSL TNX ES 73,
                ALEX

ALEX F.BURR-K5XY
2025 O"DONNELL DRIVE
LAS CRUCES, NM 88001
DONA ANA COUNTY-USA
```

*** VARIABLES ***

A$-OPERATOR CALLSIGN
B$-BAND
C$-CALLSIGN WORKED
D$-DATE OF CONTACT
E$-ANTENNA USED
M$-MODE OF OPERATION
Q$-QSL
R-HIS/HER REPORT
T$-TIME OF CONTACT
Y$-RIG USED
Z$-COMMENTS

*** PROGRAM LAYOUT ***

LINES	DESCRIPTION
5-140	LARGE LETTER GENERATOR
200-345	QSL DATA INPUT
350-600	PRINTS QSL

TO CHANGE THE CALL TO BE GENERATED IN LARGE LETTERS SIMPLY CHANGE A$ IN LINE 10 TO SUIT. ADD SPACES TO MAKE FIVE CHARACTERS.

```
265 Let D=sqr (1-(D*D))/D
270 If L1=L2 then goto 600
280 Let D=atn D
285 Let D=D*R
286 If D<0 and D>-90 then let D=D+180
290 Let D=D*69.048
300 Slow
301 Print "Statue mile distance is ";int (D+.5)
305 Print
306 Print "Kilometer distance is ";int (D*1.6093)
310 Print
311 Print "Another calculation?"
312 Print "1 = yes"
313 Print "2 = no"
320 Input A
325 Cls
330 If A=1 then goto 20
400 Stop
500 If A1>A2 then goto 1000
510 If A1<A2 then goto 1100
600 If A1>A2 then goto 1200
610 If A1<A2 then goto 1300
1000 Let C=180
1010 Goto 250
1100 Let C=0
1110 Goto 250
1200 Let D=A1-A2
1210 Goto 285
1300 Let D=A2-A1
1310 Goto 285
```

```
1 Rem "Direction"
10 Rem Direction finding program.  Formulas from ARRL antenna book.
20 Dim A$ (10)
30 Print "The N3CHT hamshack library"
40 Print "Direction finding program"
50 Print
60 Print "Use negative values for southern"
70 Print "latitudes and eastern longitudes"
80 Print
90 Print "Enter the following (in degrees"
91 Print "to two decimal places):"
95 Print
100 Print "Your latitude"
101 Let A1=40.32
102 Print A1
110 Print "Your longitude"
111 Let L1=78.92
112 Print L1
130 Print "Other latitude"
131 Input A2
132 Print A2
140 If A2=0 then let A2=90
150 Print "Other longitude"
151 Input L2
152 Print L2
160 Fast
170 Let R=57.2958
171 Let A1=A1/R
172 Let A2=A2/R
173 Let L1=L1/R
174 Let L2=L2/R
175 Let L=L1-L2
176 If L=0 then goto 500
177 If L>3.14159 then let L=L-6.28318
178 If L<-3.14159 then let L=L+6.28318
180 Let T=cos L*(cos A2/sin A2)
181 Let T=Atn T
200 Let C=((cos L/sin L)*cos(A1+T))/sin T
205 Let C=atn (1/C)
210 Let C=C*R
215 Let L+L*R
220 If L>0 and C<0 then let C=C+180
230 If L<0 and C>0 then let C=C+180
240 If L<0 and C<0 then let C=C+360
245 Let C=int (C+.5)
246 Slow
250 Print
254 Print "Clockwise bearing from north is ";C
255 Print
256 Print "Press N/L to continue"
257 Pause 33000
258 Fast
259 Cls
260 Let D=(sin A1*sin A2)+(cos A1*cos A2*cos (L/R))
```

ANTENNA DESIGN PROGRAM

```
 1 Rem "Ham"
 3 Print "The N3CHT hamshack library"
 5 Print
10 Print "The following services are"
20 Print "available:"
30 Print tab 2; "(1)  Half wave dipole design"
40 Print tab 2; "(2)  3 element yagi design"
50 Print tab 2; "(3)  Inverted vee design"
60 Print tab 2; "(4)  Full wave loop design"
70 Print tab 2; "(5)  Vertical design"
80 Print tab 2; "(6)  Quad design"
90 Print tab 2; "(7)  Delta loop design"
100 Print tab 2; "(8)
110 Print tab 2; "(9)
120 Print
130 Print "Input the number of service"
140 Print "you desire."
150 Input S
155 Cls
160 If S=1 then gosub 1000
170 If S=2 then gosub 2000
180 If S=3 then gosub 3000
190 If S=4 then gosub 4000
200 If S=5 then gosub 5000
210 If S=6 then gosub 6000
220 If S=7 then gosub 7000
230 If S=8 then gosub 8000
240 If S=9 then gosub 9000
250 Goto 3
1000 Cls
1005 Print "Half wave dipole design"
1010 Print
1020 Print "Input desired center frequency"
1030 Print "in mhz."
1040 Input F
1050 Print F
1055 Print
1060 Let L=468/F
1070 Gosub 9910
1120 Print "Necessary dipole length is ";L
1130 Print "feet, ";I;" inches."
1140 Let L=(468/F)/2
1150 Gosub 9910
1200 Print
1210 Print "One arm is ";L;" feet, and"
1220 Print I;" inches."
1230 Print
1240 Print "Want to try another frequency?"
1250 Print "(Y or N)"
1260 Input R$
1280 If R$="Y" then goto 1000
1290 Print
1300 Print "Press N/L to return to menu."
1310 Pause 33000
1320 Cls
1330 Return
```

ED. NOTE:
WATCH OUT FOR THE FUNNY LINE NUMBERING AND PAGE LAYOUT. THE PROGRAM IS COMPLETE!

```
2000 Cls
2020 Print "3 element yagi design"
2030 Print
2040 Print "Input desired center frequency"
2050 Print "in mhz."
2060 Input F
2070 Print F
2080 Print
2090 Let L=476/F
2100 Gosub 9910
2150 Print "Driven element length is ";L
2160 Print "feet, and ";I;" inches."
2170 Print
2180 Let L=501/F
2190 Gosub 9910
2240 Print "Reflector length is ";L;" feet,"
2250 Print "and ";I;" inches."
2260 Print
2270 Let L=450/F
2280 Gosub 9910
2330 Print "Director length is ";L;" feet,"
2340 Print "and ";I;" inches."
2350 Print
2355 Print "Press N/L to continue."
2356 Pause 33000
2357 Cls
2360 Let Q=(936/F)*.15
2370 Let I=12*Q
2380 Let E=sgn I
2390 Let I=abs I
2400 Let Q=int (I/12)
2410 Let I=(I-12*Q)*E
2420 Let V=(936/F)*.2
2430 Let J=12*V
2440 Let E=sgn J
2450 Let J=abs J
2460 Let V=int (J/12)
2470 Let J=(J-12*V)*E
2480 Print "Element spacing should be no"
2490 Print "less than ";Q;" feet, ";I
2500 Print "inches; and no greater than ";V
2510 Print "feet, ";J;" inches."
2520 Print
2530 Print "Want to try another frequency?"
2540 Print "(Y or N)"
2550 Input C$
2560 If C$="Y" then goto 2000
2570 Print
2580 Print "Press N/L to return to menu."
2590 Pause 33000
2600 Cls
2610 Return
3000 Cls
3010 Print "Inverted vee design"
3020 Print
3030 Print "Input desired center frequency"
3035 Print "in mhz."
```

```
4380 If R$="Y" then goto 4000
4390 Print
4400 Print "Press N/L to return to menu."
4410 Pause 33000
4420 Cls
4430 Return
5000 Cls
5010 Print "Vertical design"
5020 Print
5030 Print "Input desired center frequency"
5040 Print "in mhz."
5050 Input F
5060 Print F
5070 Print
5080 Let L=234/F
5085 Let R=240/F
5090 Gosub 9910
5100 Let S=12*R
5110 Let T=sgn S
5120 Let S=abs S
5130 Let R=int (S/12)
5135 Let S=(S-12*R)*T
5140 Print "Antenna length is ";L;"feet,"
5150 Print I;" inches.  Radials are"
5160 Print R;" feet, ";S;" inches."
5170 Print
5180 Print "Want to try another frequency?"
5190 Print "(Y or N)"
5200 Input R$
5210 If R$="Y" then goto 5000
5220 Print
5230 Print "Press N/L to return to meun."
5240 Pause 33000
5250 Cls
5260 Return
6000 Cls
6010 Print "Quad design"
6020 Print
6030 Print "Input desired center frequency"
6040 Print "in mhz."
6050 Input F
6060 Print F
6070 Print
6080 Let L=1005/F
6090 Gosub 9910
6140 Print "Driven element circumfrence is"
6150 Print L;" feet, ";I;" inches."
6160 Print
6170 Let L=1050/F
6180 Gosub 9910
6230 Print "Reflector circumfrence is ";L
6240 Print "feet, ";I;" inches."
6250 Print
6260 Let L=968/F
6270 Gosub 9910
6320 Print "Director circumfrence is ";L
6330 Print "feet, ";I;" inches."
```

```
3040 Input F
3050 Print F
3060 Print "Input the highest point on the"
3065 Print "antenna in feet."
3070 Input H
3080 Print H
3090 Print
3100 Let L=(468/2)/2
3110 Let G=(L**2)-(H**2)
3120 Gosub 9910
3170 Let G=sqr G
3180 Let D=G*12
3190 Let K=sgn D
3200 Leg D=abs D
3210 Let G=int (D/12)
3220 Let D=(D-12*G)*K
3230 Print "One leg of the inverted vee will"
3231 Print "be ";L;" feet, ";I
3232 Print "inches long - and will touch"
3233 Print "ground ";G;" feet, ";D
3234 Print "inches from the high point.
3240 Print
3250 Print "Want to try another frequency?"
3260 Print "(Y or N)"
3270 Print
3280 Input R$
3290 If R$ = "Y" then goto 3000
3300 Print "Press N/L to return to menu."
3310 Pause 33000
3320 Cls
3330 Return
4000 Cls
4010 Print "Full wave loop design"
4020 Print
4030 Print "Input desired center frequency"
4040 Print "in mhz."
4050 Input F
4060 Print F
4070 Print
4080 Let L=1005/F
4090 Gosub 9910
4140 Print "The loop is ";L;" feet, ";I
4150 Print "inches in circumfrence."
4160 Print
4170 Let L=(1005/F)/4
4180 Gosub 9910
4230 Print "4 sided loop:  ";L;" feet,"
4240 Print I;" inches per side.
4250 Print
4260 Let L=(1005/F)/3
4270 Gosub 9910
4320 Print "3 sided loop:  ";L;" feet,"
4330 Print I;" inches per side."
4340 Print
4350 Print "Want to try another frequency?"
4360 Print "(Y or N)"
4370 Input R$
```

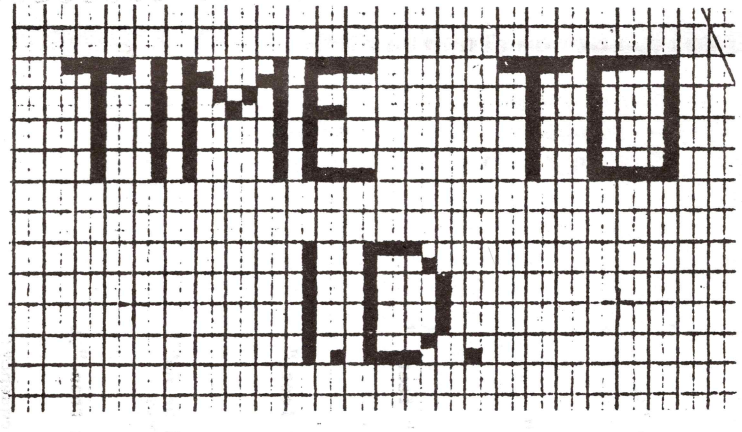
```
7170 Print
7180 Let L=968/F
7190 Gosub 9910
7200 Print "Director circumfrence is ";L
7210 Print "feet, ";I;" inches."
7220 Print
7230 Let L=(1005/F)/3
7240 Gosub 9910
7250 Print "Driven element side is ";L
7260 Print "feet, ";I;" inches."
7270 Print
7280 Print
7290 Print
7300 Print "Press N/L to continue."
7310 Pause 33000
7320 Cls
7330 Let L=(1050/F)/3
7340 Gosub 9910
7350 Print "Reflector side is ";L;" feet, "
7360 Print I;" inches."
7365 Print
7370 Let L=(968/F)/3
7380 Gosub 9910
7390 Print "Director side is ";L;" feet,"
7400 Print I;" inches."
7410 Print
7420 Let L=(1005/F)*.15
7430 Gosub 9910
7440 Print "Element spacing should be no"
7450 Print "less than ";L;" feet, ";I
7460 Let L=(1005/F)*.20
7470 Gosub 9910
7480 Print "inches; and no greater than ";L
8490 Print "feet, ";I;" inches.
7500 Print
7510 Print "Want to try another frequency?"
7520 Print "(Y or N)"
7530 Input R$
7540 If R$="Y" then goto 7000
7550 Print
7560 Print "Press N/L to return to menu."
7570 Pause 33000
7580 Cls
7590 Return

9910 Let I=12*L
9920 Let E=sgn I
9930 Let I=abs I
9940 Let L=int (I/12)
9950 Let I=(I-12*L)*E
9960 Return
```

```
6340 Print
6350 Let L=(1005/F)/4
6360 Gosub 9910
6410 Print "Driven element side is ";L
6420 Print "feet, ";I;" inches."
6430 Print
6440 Print
6450 Print
6460 Print "Press N/L to continue."
6470 Pause 33000
6475 Cls
6480 Let L=(1050/F)/4
6490 Gosub 9910
6540 Print "Reflector side is ";L;" feet,"
6550 Print I;" inches."
6560 Print
6570 Let L=(968/F)/4
6580 Gosub 9910
6630 Print "Director side is ";L;" feet,"
6640 Print I;" inches."
6650 Print
6660 Let L=(1005/F)*.15
6670 Gosub 9910
6680 Print "Element spacing should be no"
6690 Print "less than ";L;" feet, ";I
6700 Let L=(1005/F)*.20
6710 Gosub 9910
6720 Print "inches; and no greater than ";L
6730 Print "feet, ";I;" inches."
6740 Print
6750 Print "Want to try another frequency?"
6760 Print "(Y or N)"
6770 Input R$
6780 If R$="Y" then goto 6000
6790 Print
6800 Print "Press N/L to return to menu."
6810 Pause 33000
6820 Cls
6830 Return
7000 Cls
7010 Print "Delta loop design"
7020 Print
7030 Print "Input desired center frequency"
7040 Print "in mhz."
7050 Input F
7060 Print F
7070 Print
7080 Let L=1005/F
7090 Gosub 9910
7100 Print "Driven element circumfrence is"
7110 Print L;" feet, ";I;" inches.
7120 Print
7130 Let L=1050/F
7140 Gosub 9910
7150 Print "Reflector circumfrence is ";L
7160 Print "feet, ";I;" inches."
```

```
 1 Rem "Timer 2"
20 Let S=600
30 Print at 10,6;"Time left: ";S;" seconds     "
40 Pause 5
50 Let S=S-1
60 If S>0 then goto 30
80 Cls
90 Fast
100 For A=30 to 37
110 Plot 13,A
120 Plot 17,A
130 Plot 19,A
140 Plot 25,A
150 Plot 27,A
160 Plot 42,A
170 Plot 46,A
180 Plot 51,A
190 Next A
200 For A=18 to 25
210 Plot 27,A
220 Plot 31,A
230 Plot 36,A
240 Next A
250 For B=11 to 15
260 Plot B,37
270 Next B
280 For B=27 to 31
290 Plot B,30
300 Plot B,34
310 Plot B,37
320 Next B
330 For B=40 to 44
340 Plot B,37
350 Next B
360 For B=46 to 51
370 Plot B,30
380 Plot B,37
390 Next B
400 For B=31 to 36
410 Plot B,18
420 Plot B,25
430 Next B
440 Plot 20,36
450 Plot 21,35
460 Plot 22,34
470 Plot 23,35
480 Plot 24,36
490 Unplot 30,34
500 Unplot 31,34
510 Plot 29,18
520 Plot 35,24
530 Plot 35,19
540 Unplot 35,25
550 Unplot 36,25
560 Unplot 36,24
570 Unplot 36,19
580 Unplot 36,18
590 Unplot 35,18
600 Plot 38,18
610 Print at 15,6;"Press N/L to reset"
620 Slow
630 Pause 33000
640 Cls
650 Goto 20
```

(10 MINUTE TIMER PROGRAM)



Antenna Design Program

by

George Paczolt, N3CHT

This is a menu oriented program containing seven antenna type designs with provisions to add two more. The subroutine (line 9910) enables the final values to be printed out as 6 feet 4 inches instead of 6.3333333 feet.

10 Minute Timer Program

by

George Paczolt, N3CHT

This one prints 'Time to I.D.' in BIG letters when time expires. It is accurate over a ten minute period, not quite as good as a stopwatch. Now everyone will need 3 ZX's; one for timekeeping, one for RTTY/CW use, and one for logging!

Wavelength/Freq Program

by

George Paczolt, N3CHT

Definitely for beginners.

```
 1 Rem "Wavelength"
10 Rem N3CHT - 16 November 1982
20 Print "Wavelength/frequency conversion"
30 Print
40 Print "Input:  1.  Unit of measure"
50 Print "         2.  Definition of unit"
60 Print "             (MhZ or meters)"
70 Input A
80 Input A$
90 Cls
100 If A$="MhZ" then gosub 1000
110 If A$="Meters" then gosub 2000
120 If A$<>"MhZ" and A$<>"meters" then goto
130 Print A;" ";A$;" = ";B;" ";B$        40
140 Print
150 Print
160 Print "Another conversion?"
170 Print "(Y or N)"
180 Input C$
190 Cls
200 If C$="Y" then goto 40
210 Stop
1000 Rem MhZ to meters
1010 Let B$="meters"
1020 Let B=300/A
1030 Return
2000 Rem Meters to mhz
2010 Let B$="MhZ"
2020 Let B=300/A
2030 Return
```

== T/S 1000 HAM HELPER SERIES ==

(SEE ARTICLE 7 PAGES FORWARD)

[illegible] HAM HELPER

BY

KRAIG D. PRITTS - KA2LHO

[illegible] COMMANDS

```
1.  REPEATER INFO
2.  CONTEST OPERATOR
3.  Q-SIGNALS
4.  THIRD-PARTY AGREEMENTS
5.  FREQUENCY CHECK
6.  EXIT

COMMAND?
```

[illegible] REPEATER INFO

```
THIS PROGRAM WILL PROVIDE
INFORMATION ABOUT YOUR FAVORITE
REPEATER(S). ENTER THE
SUFFIX OF ITS CALL OR THE
FREQUENCY PAIR (13/73) OR THE
NAME OF THE CITY WHERE REPEATER
IS LOCATED.

STATION?
```

[illegible] CONTEST OPERATOR

```
ORDERS PLEASE?

L=LIST ALL CONTACTS
E=LOG A CONTACT
S=SEARCH FOR DUPLICATE
D=DELETE A CONTACT

(ENTER <Q> TO QUIT)
```

[illegible] NOTE

ALL SEARCHES ARE BASED UPON THE FIRST THREE LETTERS AND/OR NUMBERS OF THE ENTRY.

[illegible] PRIVILEGES

```
<N>OVICE
<T>ECHNICIAN
<G>ENERAL
<A>DVANCED
<E>XTRA

WHICH CLASS ARE YOU?

BANDS OF OPERATION

1. 3.5(80M)      4. 21.0(15M)
2. 7.0(40M)      5. 28.0(10M)
3. 14.0(20M)     6. 144.0(2M)

WHICH BAND ARE YOU OPERATING ON?
```

[illegible] 20 MTR.

```
PHONE PRIVILEGES

14.2 - 14.35 MHZ

DO YOU WISH A NEW FREQUENCY
CHECK (Y/N)?
```

HAM HELPER PROGRAM

```
  1 REM "WORKER"
  3 GOTO 11
  6 LET B$=INKEY$
  9 RETURN
 11 DIM N$(100,10)
 12 CLS
 13 PRINT AT 1,0;"== T/S 1000 H
AM HELPER SERIES ==";
 15 PRINT AT 5,2;"[illegible]
[illegible]"
 18 PRINT AT 7,15;"BY"
 21 PRINT AT 9,4;"KRAIG D. PRIT
TS - KA2LHO"
 22 PRINT AT 20,0;"ADAPTED FROM
 A PROGRAM WRITTEN","FOR 73 MAGA
ZINE (DEC. 1982)."
 23 PAUSE 300
 24 CLS
 27 PRINT AT 1,0;"[illegible]
[illegible]"
 29 PRINT
 30 PRINT
 33 PRINT "1.  REPEATER INFO"
 36 PRINT "2.  CONTEST OPERATOR
"
 39 PRINT "3.  0-SIGNALS"
 42 PRINT "4.  THIRD-PARTY AGRE
EMENTS"
 45 PRINT "5.  FREQUENCY CHECK"
 46 PRINT "6.  EXIT"
 50 PRINT
 51 PRINT "COMMAND?"
 54 GOSUB 6
 57 IF INKEY$="" THEN GOTO 57
 60 IF INKEY$="1" THEN GOTO 81
 63 IF INKEY$="2" THEN GOTO 240
 66 IF INKEY$="3" THEN GOTO 489
 69 IF INKEY$="4" THEN GOTO 741
 72 IF INKEY$="5" THEN GOTO 894
 75 IF INKEY$="6" THEN GOTO 145
2
 78 GOTO 54
 81 CLS
 82 PRINT
 83 PRINT AT 1,4;"[illegible]
[illegible]"
 84 PRINT
 87 PRINT "THIS PROGRAM WILL PR
OVIDE"
 90 PRINT "INFORMATION ABOUT YO
UR FAVORITE"
 93 PRINT "REPEATER(S). ENTER T
HE"
 96 PRINT "SUFFIX OF ITS CALL O
R THE"
 99 PRINT "FREQUENCY PAIR (13/7
3) OR THE"
 102 PRINT "NAME OF THE CITY WHE
RE REPEATER"
 105 PRINT "IS LOCATED."
 108 PRINT
 111 PRINT
 114 PRINT "STATION?"
 117 INPUT S$
 120 LET X=0
 123 IF S$="JR" OR S$="115/715"
OR S$="BURLINGTON" THEN GOSUB 15
0
 126 IF S$="JIT" OR S$="16/76" O
R S$="UTICA" THEN GOSUB 159
 129 IF S$="NSU" OR S$="22/82" O
R S$="ILION" THEN GOSUB 166
 132 IF S$="IXN" OR S$="26/88" O
R S$="ROME" THEN GOSUB 177
 135 IF S$="JIT" OR S$="69/09" O
R S$="UTICA" THEN GOSUB 186
 138 IF S$="GVI" OR S$="34/94" O
R S$="UTICA" THEN GOSUB 195
 141 IF S$="SEU" OR S$="25/85" O
R S$="ONEONTA" THEN GOSUB 204
 144 IF X>0 THEN GOTO 219
 147 GOTO 213
 150 PRINT "K9JR,115/715,BURLING
TON,NY"
 153 LET X=1
 156 RETURN
 159 PRINT "W2JIT,16/76,UTICA,NY
"
 162 LET X=1
 165 RETURN
 168 PRINT "WB2NSU,22/82,ILION,N
Y"
 171 LET X=1
 174 RETURN
 177 PRINT "K2IXN,26/88,ROME,NY"
 180 LET X=1
 183 RETURN
 186 PRINT "W2JIT,69/09,UTICA,NY
"
 189 LET X=1
 192 RETURN
 195 PRINT "K2GVI,34/94,UTICA,NY
"
 198 LET X=1
 201 RETURN
 204 PRINT "W2SEU,25/85,ONEONTA,
NY"
 207 LET X=1
 210 RETURN
 213 PRINT
 216 PRINT "THAT STATION IS NOT
ON FILE."
 219 PRINT
 222 PRINT "ANOTHER STATION?(Y/N
)"
 225 GOSUB 6
 226 IF INKEY$="" THEN GOTO 226
 231 IF INKEY$="Y" THEN GOTO 81
 234 IF INKEY$="N" THEN GOTO 24
 237 GOTO 225
 240 CLS
 243 LET N$(100)="END"
 246 LET E$=""
 249 CLS
 252 PRINT AT 1,7;"[illegible]
[illegible]",,,,"ORDERS PLEASE?",,,,"
L=LIST ALL CONTACTS","E=LOG A CO
NTACT","S=SEARCH FOR DUPLICATE"
,"D=DELETE A CONTACT"
 255 PRINT AT 14,9;"[illegible]
[illegible]",,,,"ALL SEARCHES ARE BASED UP
ON THE","FIRST THREE LETTERS AND
/OR NUM-","BERS OF THE ENTRY."
 258 PRINT AT 11,0;"(ENTER (0) T
O QUIT)"
 261 GOSUB 6
 264 IF INKEY$="E" THEN GOTO 360
 267 IF INKEY$="" THEN GOTO 267
 270 IF INKEY$="S" THEN GOTO 268
 273 IF INKEY$="D" THEN GOTO 402
 276 IF INKEY$="L" THEN GOTO 336
 279 IF INKEY$="0" THEN GOTO 24
 282 GOTO 261
 285 PRINT Z$;" NOT FOUND"
 288 CLS
 291 PRINT AT 1,0;"[illegible]
[illegible]"
 294 INPUT Z$
 297 IF LEN Z$<3 THEN GOTO 294
 300 FAST
 303 LET F=0
 306 LET X=1
 309 CLS
 312 IF N$(X, TO 3)<>Z$( TO 3) T
HEN GOTO 321
 315 LET F=1
 318 PRINT ,,N$(X)
 321 LET X=X+1
 324 IF N$(X, TO 3)<>"END" THEN
GOTO 312
 327 IF F=0 THEN PRINT Z$;" NOT
FOUND",,,"--- CALL IT."
 330 SLOW
 333 GOTO 471
 336 CLS
```

```
***VARIABLES***
B$-INKEY$ INPUT (THROUGHOUT THE
   PROGRAM) AND BAND OF OPERA-
   TION (FREQUENCY CHECK)

C$-CLASS OF LICENSE (FREQUENCY
   CHECK)

E$-OPEN SLOT IN MEMORY (CONTEST
   OPERATOR)

M$-MODE OF OPERATION (FREQUENCY
   CHECK)

N$(100,10)-ARRAY FOR 100 CALLS
   OF UP TO 10 CHARACTERS EACH
   (CONTEST OPERATOR)

0$-INFORMATION INPUT (0-SIGNALS)

S$-INFORMATION INPUT (REPEATER
   INFO)

Z$-INFORMATION INPUT (CONTEST OP
   ERATOR)


***PROGRAM LAYOUT***

LINES:        DESCRIPTION:
12-23         TITLE PAGE (FIG 1)

24-78         MAIN MENU (FIG 2)

81-237        REPEATER INFORMATION
              (FIG 3)

240-486       CONTEST OPERATOR (FIG
              4)

489-736       0-SIGNALS

741-891       THIRD-PARTY AGREEMENT

894-1449      FREQUENCY CHECK (FIG
              5, 6, 7, 8)

1452-1461     EXIT PROGRAM
```

```
***INVERSE CHARACTERS***
 ($=INVERSE SPACE)

LINE:       INVERSE CHARACTERS:
15          $$$$$M$A$M$$U$O$R$K$E$R$
            $$$$

27          $MENU$OF$COMMANDS$

83          $$$$$REPEATER$INFO$$$$$

252         $CONTEST$OPERATOR$

255         $$$$$NOTE$$$$$

291         $CALL$PLEASE?$

393         $NEW$CONTACT?$

405         $DELETE$WHICH$ENTRY?$

492         $0-SIGNALS$

744         $THIRD-PARTY$AGREEMENTS$

810         NORTH$AMERICA

822         SOUTH$AMERICA

834         EUROPE

846         ASIA

858         OCEANIA

870         AFRICA

876         (LESS THAN SYMBOL);(GREA
            TER THAN SYMBOL)

897         $CLASS$OF$LICENSE?$

978         $NOVICES$CANNOT$OPERATE$
            THERE$

984         $TECHS$CANNOT$OPERATE$TH
            ERE$

993         $MODE$OF$OPERATION?$

1008        $NOVICES$DO$NOT$HAVE$PHO
            NE$;$PRIVILEGES$

1155        $NOVICE$
1161,1167,1173

1179        $TECHNICIAN$
1191,1197,1203,1209

1215        $GENERAL$
1221,1227,1233,1239,1245,1251,
1257,1263,1269,1275,1281

1287        $ADVANCED$
1293,1299,1305,1311,1317,1323,
1329,1335,1341,1347,1353

1359        $EXTRA$
1365,1371,1377,1383,1389,1395,
1401,1407,1413,1419,1425
```

```
 777 IF INKEY$="1" THEN GOTO 804
 780 IF INKEY$="2" THEN GOTO 816
 783 IF INKEY$="3" THEN GOTO 828
 786 IF INKEY$="4" THEN GOTO 840
 789 IF INKEY$="5" THEN GOTO 852
 792 IF INKEY$="6" THEN GOTO 864
 795 GOTO 771
 798 PRINT "THE UNITED STATES HA
S THIRD-","PARTY TRAFFIC AGREEME
NTS IN:"
 801 RETURN
 804 CLS
 807 GOSUB 798
 810 PRINT "[illegible]",,"ANT
IGUA & BARBUDA","CANADA",,"COSTA
 RICA",,"CUBA",,"DOMINICAN REPUB
LIC","EL SALVADOR",,"GUATEMALA",
,"HAITI",,"HONDURAS",,"JAMAICA",
,"MEXICO",,"NICARAGUA",,"PANAMA"
,,"ST. LUCIA"
 813 GOTO 876
 816 CLS
 819 GOSUB 798
 822 PRINT "[illegible]",,"ARG
ENTINA",,"BOLIVIA",,"BRAZIL",,"C
HILE",,"COLOMBIA",,"ECUADOR",,"G
UYANA",,"PARAGUAY",,"PERU",,"TRI
NIDAD & TOBAGO","URUGUAY",,"VENE
ZUELA"
 825 GOTO 876
 828 CLS
 831 GOSUB 798
 834 PRINT "[illegible]","4U1ITU",,"
INTL TEL UNION"
 837 GOTO 876
 840 CLS
 843 GOSUB 798
 846 PRINT "[illegible]",,"ISRAEL",,"JO
RDAN"
 849 GOTO 876
 852 CLS
 855 GOSUB 798
 858 PRINT "[illegible]",,"AUSTRALIA
","PITCAIRN ISLAND"
 861 GOTO 876
 864 CLS
 867 GOSUB 798
 870 PRINT "[illegible]",,"GHANA",,"L
IBERIA",,"THE GAMBIA"
 873 GOTO 876
 876 PRINT "CHECK ANOTHER (Y/N)
?"
 879 GOSUB 6
 882 IF INKEY$="Y" THEN GOTO 741
 885 IF INKEY$="" THEN GOTO 885
 888 IF INKEY$="N" THEN GOTO 24
 891 GOTO 879
 894 CLS
 897 PRINT AT 1,0;"[illegible]
[illegible]"
 900 PRINT AT 3,0;"(N)OVICE"
 903 PRINT "(T)ECHNICIAN"
 906 PRINT "(G)ENERAL"
 909 PRINT "(A)DVANCED"
 912 PRINT "(E)XTRA"
 915 PRINT
 918 PRINT "WHICH CLASS ARE YOU?
"
 921 INPUT C$
 924 IF C$="N" OR C$="T" OR C$="
G" OR C$="A" OR C$="E" THEN GOTO
 930
 927 GOTO 921
 930 CLS
 933 PRINT "BANDS OF OPERATION"
 936 PRINT
 939 PRINT "1. 3.5(80M)";TAB 16;
"4. 21.0(15M)"
 942 PRINT "2. 7.0(40M)";TAB 16;
"5. 28.0(10M)"
 945 PRINT "3. 14.0(20M)";TAB 16
;"6. 144.0(2M)"
 948 PRINT
 951 PRINT
 954 PRINT "WHICH BAND ARE YOU O
PERATING ON?"
 957 PRINT
 960 GOSUB 6
 963 IF B$<"1" OR B$)"6" THEN GO
TO 960
 966 IF C$="N" AND B$="3" THEN G
OTO 978
 969 IF C$="N" AND B$="6" THEN G
OTO 978
 972 IF C$="T" AND B$="3" THEN G
OTO 984
 975 GOTO 990
 978 PRINT ,,"[illegible]
[illegible]"
 981 GOTO 1434
 984 PRINT ,,"[illegible]
[illegible]"
 987 GOTO 1434
 990 CLS
 993 PRINT AT 1,0;"[illegible]
[illegible]","(C)U OR (P)HONE"
 996 INPUT M$
 999 IF C$="N" AND M$="P" THEN G
OTO 1008
1002 CLS
1005 GOTO 1014
1008 PRINT ,,"[illegible]
[illegible]"
1011 GOTO 1434
1014 IF C$="N" AND B$="1" THEN G
OSUB 1155
1017 IF C$="N" AND B$="2" THEN G
OSUB 1161
1020 IF C$="N" AND B$="4" THEN G
OSUB 1167
1023 IF C$="N" AND B$="5" THEN G
OSUB 1173
1026 IF C$="T" AND B$="1" THEN G
OSUB 1179
1029 IF C$="T" AND B$="2" THEN G
OSUB 1185
1032 IF C$="T" AND B$="4" THEN G
OSUB 1191
1035 IF C$="T" AND B$="5" THEN G
OSUB 1197
1038 IF C$="T" AND B$="6" AND M$
="C" THEN GOSUB 1203
1041 IF C$="T" AND B$="6" AND M$
="P" THEN GOSUB 1209
1044 IF C$="G" AND B$="1" AND M$
="C" THEN GOSUB 1215
1047 IF C$="G" AND B$="2" AND M$
="C" THEN GOSUB 1221
1050 IF C$="G" AND B$="3" AND M$
="C" THEN GOSUB 1227
1053 IF C$="G" AND B$="4" AND M$
="C" THEN GOSUB 1233
1056 IF C$="G" AND B$="5" AND M$
="C" THEN GOSUB 1239
1059 IF C$="G" AND B$="6" AND M$
="C" THEN GOSUB 1245
1062 IF C$="G" AND B$="1" AND M$
="P" THEN GOSUB 1251
1065 IF C$="G" AND B$="2" AND M$
="P" THEN GOSUB 1257
1068 IF C$="G" AND B$="3" AND M$
="P" THEN GOSUB 1263
1071 IF C$="G" AND B$="4" AND M$
="P" THEN GOSUB 1269
1074 IF C$="G" AND B$="5" AND M$
="P" THEN GOSUB 1275
1077 IF C$="G" AND B$="6" AND M$
="P" THEN GOSUB 1281
1080 IF C$="A" AND B$="1" AND M$
="C" THEN GOSUB 1287
1083 IF C$="A" AND B$="2" AND M$
="C" THEN GOSUB 1293
1086 IF C$="A" AND B$="3" AND M$
="C" THEN GOSUB 1299
1089 IF C$="A" AND B$="4" AND M$
="C" THEN GOSUB 1305
1092 IF C$="A" AND B$="5" AND M$
="C" THEN GOSUB 1311
1095 IF C$="A" AND B$="6" AND M$
="C" THEN GOSUB 1317
1098 IF C$="A" AND B$="1" AND M$
="P" THEN GOSUB 1323
1101 IF C$="A" AND B$="2" AND M$
="P" THEN GOSUB 1329
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```
1104 IF C$="A" AND B$="3" AND M$
="P" THEN GOSUB 1335
1107 IF C$="A" AND B$="4" AND M$
="P" THEN GOSUB 1341
1110 IF C$="A" AND B$="5" AND M$
="P" THEN GOSUB 1347
1113 IF C$="A" AND B$="6" AND M$
="P" THEN GOSUB 1353
1116 IF C$="E" AND B$="1" AND M$
="C" THEN GOSUB 1359
1119 IF C$="E" AND B$="2" AND M$
="C" THEN GOSUB 1365
1122 IF C$="E" AND B$="3" AND M$
="C" THEN GOSUB 1371
1125 IF C$="E" AND B$="4" AND M$
="C" THEN GOSUB 1377
1128 IF C$="E" AND B$="5" AND M$
="C" THEN GOSUB 1383
1131 IF C$="E" AND B$="6" AND M$
="C" THEN GOSUB 1389
1134 IF C$="E" AND B$="1" AND M$
="P" THEN GOSUB 1395
1137 IF C$="E" AND B$="2" AND M$
="P" THEN GOSUB 1401
1140 IF C$="E" AND B$="3" AND M$
="P" THEN GOSUB 1407
1143 IF C$="E" AND B$="4" AND M$
="P" THEN GOSUB 1413
1146 IF C$="E" AND B$="5" AND M$
="P" THEN GOSUB 1419
1149 IF C$="E" AND B$="6" AND M$
="P" THEN GOSUB 1425
1152 GOTO 1434
1155 LET X=0
1158 LET X=X+1
1161 SCROLL
1164 PRINT N$(X)
1167 IF N$(X, TO 3)<>"END" THEN
GOTO 1158
1170 SCROLL
1173 GOTO 471
1176 CLS
1179 FAST
1182 LET X=1
1185 IF N$(X, TO 3)="END" THEN G
OTO 1197
1188 IF N$(X)=E$ THEN GOTO 1197
1191 LET X=X+1
1194 GOTO 1185
1197 PRINT ,,"SORRY--NO MORE ROO
M."
1200 GOTO 471
1203 CLS
1206 SLOW
1209 PRINT AT 1,0;"[illegible]
[illegible]"
1212 INPUT N$(X)
1215 GOTO 249
1218 CLS
1221 PRINT AT 1,0;"[illegible]
[illegible]"
1224 INPUT Z$
1227 FAST
1230 LET X=1
1233 IF N$(X, TO 3)="END" THEN G
OTO 1250
1236 IF N$(X, TO 3)<>Z$( TO 3) T
HEN GOTO 1248
1239 CLS
1242 PRINT N$(X)
1245 PRINT "PRESS ""D"" TO DELET
E",,,"OR ENTER FOR NEXT ";Z$
1248 SLOW
1251 INPUT D$
1254 IF D$<>"D" THEN GOTO 1248
1257 PRINT ,,N$(X);" DELETED"
1260 LET N$(X)=E$
1263 GOTO 1185
1266 CLS
1269 PRINT ,,"NO MORE ";Z$;" CAL
LS IN THE LIST."
1272 SLOW
1275 GOTO 1185
1278 LET X=X+1
1281 FAST
1284 GOTO 1233
1287 PRINT AT 21,6;"PRESS ""R""
TO RETURN"
1290 SLOW
1293 GOSUB 6
1296 IF INKEY$="" THEN GOTO 1296
1299 IF INKEY$="R" THEN GOTO 249
1302 IF INKEY$<>"R" THEN GOTO 1293
1305 CLS
1308 PRINT AT 1,0;"[illegible]",
,"(ENTER <S> TO STOP)"
1311 INPUT 0$
1314 IF 0$="S" THEN GOTO 24
1317 PRINT
1320 IF 0$="ORL" THEN GOTO 576
1323 IF 0$="ORM" THEN GOTO 582
1326 IF 0$="ORN" THEN GOTO 588
1329 IF 0$="ORO" THEN GOTO 594
1332 IF 0$="ORP" THEN GOTO 600
1335 IF 0$="ORQ" THEN GOTO 606
1338 IF 0$="ORS" THEN GOTO 612
1341 IF 0$="ORT" THEN GOTO 618
1344 IF 0$="ORU" THEN GOTO 624
1347 IF 0$="ORV" THEN GOTO 630
1350 IF 0$="ORX" THEN GOTO 636
1353 IF 0$="ORZ" THEN GOTO 642
1356 IF 0$="OSB" THEN GOTO 648
1359 IF 0$="OSK" THEN GOTO 654
1362 IF 0$="OSL" THEN GOTO 660
1365 IF 0$="OSM" THEN GOTO 666
1368 IF 0$="OSP" THEN GOTO 672
1371 IF 0$="OSV" THEN GOTO 678
1374 IF 0$="OSY" THEN GOTO 684
1377 IF 0$="OTB" THEN GOTO 690
1380 IF 0$="OTC" THEN GOTO 696
1383 IF 0$="OTH" THEN GOTO 702
1386 IF 0$="OTR" THEN GOTO 708
```

```
1389 GOTO 714
1392 PRINT "ORL: ARE YOU BUSY?"
1395 GOTO 720
1398 PRINT "ORM: AM I BEING INTE
RFERED WITH?"
1401 GOTO 720
1404 PRINT "ORN: IS THERE STATIC
?"
1407 GOTO 720
1410 PRINT "ORO: SHALL I INCREAS
E POWER?"
1413 GOTO 720
1416 PRINT "ORP: SHALL I DECREAS
EPOWER?"
1419 GOTO 720
1422 PRINT "ORQ: SHALL I SEND FF
STER?"
1425 GOTO 720
1428 PRINT "ORS: SHALL I SEND SL
OWER?"
1431 GOTO 720
1434 PRINT "ORT: SHALL I STOP SE
NDING?"
1437 GOTO 720
1440 PRINT "ORU: HAVE YOU ANYTHI
NG FOR ME?"
1443 GOTO 720
1446 PRINT "ORV: ARE YOU READY?"
1449 GOTO 720
1452 PRINT "ORX: WHEN WILL YOU C
ALL AGAIN?"
1455 GOTO 720
1458 PRINT "ORZ: WHO IS CALLING
ME?"
1461 GOTO 720
1464 PRINT "OSB: ARE MY SIGNALS
FADING?"
1467 GOTO 720
1470 PRINT "OSK: DO YOU HAVE BRE
AK-IN?"
1473 GOTO 720
1476 PRINT "OSL: DO YOU ACKNOWLE
DGE RECEIPT?"
1479 GOTO 720
1482 PRINT "OSM: SHALL I REPEAT
LAST MESSAGE?"
1485 GOTO 720
1488 PRINT "OSP: WILL YOU RELAY?
"
1491 GOTO 720
1494 PRINT "OSV: SHALL I SEND A
SRIES OF V/S?"
1497 GOTO 720
1500 PRINT "OSY: SHALL I CHANGE
FREQUENCY?"
1503 GOTO 720
1506 PRINT "OTB: WORD COUNT AGRE
E?"
1509 GOTO 720
1512 PRINT "OTC: HOW MANY MESSAG
ES DO YOU HAVE?"
1515 GOTO 720
1518 PRINT "OTH: WHAT IS YOUR LO
CATION?"
1521 GOTO 720
1524 PRINT "OTR:WHAT IS YOUR TIM
E?"
1527 GOTO 720
1530 PRINT
1533 PRINT "THAT ONE IS NOT ON F
ILE."
1536 PRINT
1539 PRINT "ANOTHER ONE (Y/N)?"
1542 GOSUB 6
1545 IF INKEY$="" THEN GOTO 1545
1548 IF INKEY$="Y" THEN GOTO 1485
1551 IF INKEY$="N" THEN GOTO 24
1554 GOTO 1545
1557 CLS
1560 PRINT AT 1,0;"[illegible]
[illegible]"
1563 PRINT
1566 PRINT "CONTINENT?"
1569 PRINT ,,,"1.  N. AMERICA"
1572 PRINT ,,"2.  S. AMERICA"
1575 PRINT "3.  EUROPE"
1578 PRINT "4.  ASIA"
1581 PRINT "5.  OCEANIA"
1584 PRINT "6.  AFRICA"
1587 GOSUB 6
1590 IF INKEY$="" THEN GOTO 1590
```

```
1104 IF C$="A" AND B$="3" AND M$
="P" THEN GOSUB 1335
1107 IF C$="A" AND B$="4" AND M$
="P" THEN GOSUB 1341
1110 IF C$="A" AND B$="5" AND M$
="P" THEN GOSUB 1347
1113 IF C$="A" AND B$="6" AND M$
="P" THEN GOSUB 1353
1116 IF C$="E" AND B$="1" AND M$
="C" THEN GOSUB 1359
1119 IF C$="E" AND B$="2" AND M$
="C" THEN GOSUB 1365
1122 IF C$="E" AND B$="3" AND M$
="C" THEN GOSUB 1371
1125 IF C$="E" AND B$="4" AND M$
="C" THEN GOSUB 1377
1128 IF C$="E" AND B$="5" AND M$
="C" THEN GOSUB 1383
1131 IF C$="E" AND B$="6" AND M$
="C" THEN GOSUB 1389
1134 IF C$="E" AND B$="1" AND M$
="P" THEN GOSUB 1395
1137 IF C$="E" AND B$="2" AND M$
="P" THEN GOSUB 1401
1140 IF C$="E" AND B$="3" AND M$
="P" THEN GOSUB 1407
1143 IF C$="E" AND B$="4" AND M$
="P" THEN GOSUB 1413
1146 IF C$="E" AND B$="5" AND M$
="P" THEN GOSUB 1419
1149 IF C$="E" AND B$="6" AND M$
="P" THEN GOSUB 1425
1152 GOTO 1431
1155 PRINT AT 1,0;"[illegible] 60 M
TR.",,,"CU PRIVILEGES",,,,"3.7 -
 3.75 MHZ"
1158 RETURN
1161 PRINT AT 1,0;"[illegible] 40 M
TR.",,,"CU PRIVILEGES",,,,"7.1 -
 7.15 MHZ"
1164 RETURN
1167 PRINT AT 1,0;"[illegible] 15 M
TR.",,,"CU PRIVILEGES",,,,"21.1
 - 21.2 MHZ"
1170 RETURN
1173 PRINT AT 1,0;"[illegible] 10 M
TR.",,,"CU PRIVILEGES",,,,"28.1
 - 28.2 MHZ"
1176 RETURN
1179 PRINT AT 1,0;"[illegible]
60 MTR.",,,"CU PRIVILEGES",,,,"3
.7 - 3.75 MHZ"
1182 RETURN
1185 PRINT AT 1,0;"[illegible]
40 MTR.",,,"CU PRIVILEGES",,,,"7
.1 - 7.15 MHZ"
1188 RETURN
1191 PRINT AT 1,0;"[illegible]
15 MTR.",,,"CU PRIVILEGES",,,,"2
1.1 - 21.2 MHZ"
1194 RETURN
1197 PRINT AT 1,0;"[illegible]
10 MTR.",,,"CU PRIVILEGES",,,,"2
8.1 - 28.2 MHZ"
1200 RETURN
1203 PRINT AT 1,0;"[illegible]
2 MTR.",,,"CU PRIVILEGES",,,,"14
4.0 - 144.1 MHZ"
1206 RETURN
1209 PRINT AT 1,0;"[illegible]
2 MTR.",,,"PHONE PRIVILEGES",,,"
144.1 - 148.0 MHZ"
1212 RETURN
1215 PRINT AT 1,0;"[illegible] 60
MTR.",,,"CU PRIVILEGES",,,,"3.52
5 - 3.775 MHZ"
1218 RETURN
1221 PRINT AT 1,0;"[illegible] 40
MTR.",,,"CU PRIVILEGES",,,,"7.02
5 - 7.16 MHZ"
1224 RETURN
1227 PRINT AT 1,0;"[illegible] 20
MTR.",,,"CU PRIVILEGES",,,,"14.0
25 - 14.2 MHZ"
1230 RETURN
1233 PRINT AT 1,0;"[illegible] 15
MTR.",,,"CU PRIVILEGES",,,,"21.0
5 - 21.25 MHZ"
1236 RETURN
1239 PRINT AT 1,0;"[illegible] 10
MTR.",,,"CU PRIVILEGES",,,,"28.0
 - 28.5 MHZ"
1242 RETURN
1245 PRINT AT 1,0;"[illegible] 2 M
TR.",,,"CU PRIVILEGES",,,,"144.0
 - 144.1 MHZ"
1248 RETURN
1251 PRINT AT 1,0;"[illegible] 60
MTR.",,,"PHONE PRIVILEGES",,,"3.
59 - 4.0 MHZ"
1254 RETURN
1257 PRINT AT 1,0;"[illegible] 40
MTR.",,,"PHONE PRIVILEGES",,,"7.
225 - 7.3 MHZ"
1260 RETURN
1263 PRINT AT 1,0;"[illegible] 20
MTR.",,,"PHONE PRIVILEGES",,,"14
.275 - 14.35 MHZ"
1266 RETURN
1269 PRINT AT 1,0;"[illegible] 15
MTR.",,,"PHONE PRIVILEGES",,,"21
.35 - 21.45 MHZ"
1272 RETURN
1275 PRINT AT 1,0;"[illegible] 10
MTR.",,,"PHONE PRIVILEGES",,,"28
.5 - 29.7 MHZ"
1278 RETURN
1281 PRINT AT 1,0;"[illegible] 2 M
TR.",,,"PHONE PRIVILEGES",,,"144
.1 - 148.0 MHZ"
1284 RETURN
1287 PRINT AT 1,0;"[illegible] 60
MTR.",,,"CU PRIVILEGES",,,,"3.5
25 - 3.775 MHZ"
1290 RETURN
1293 PRINT AT 1,0;"[illegible] 40
MTR.",,,"CU PRIVILEGES",,,,"7.0
25 - 7.15 MHZ"
1296 RETURN
1299 PRINT AT 1,0;"[illegible] 20
MTR.",,,"CU PRIVILEGES",,,,"14.
025 - 14.2 MHZ"
1302 RETURN
1305 PRINT AT 1,0;"[illegible] 15
MTR.",,,"CU PRIVILEGES",,,,"21.
025 - 21.25 MHZ"
1308 RETURN
1311 PRINT AT 1,0;"[illegible] 10
MTR.",,,"CU PRIVILEGES",,,,"28.
0 - 28.5 MHZ"
1314 RETURN
1317 PRINT AT 1,0;"[illegible] 2
MTR.",,,"CU PRIVILEGES",,,,"144.
0 - 144.1 MHZ"
1320 RETURN
1323 PRINT AT 1,0;"[illegible] 60
MTR.",,,"PHONE PRIVILEGES",,,"3
.5 - 4.0 MHZ"
1326 RETURN
1329 PRINT AT 1,0;"[illegible] 40
MTR.",,,"PHONE PRIVILEGES",,,"7
.15 - 7.3 MHZ"
1332 RETURN
1335 PRINT AT 1,0;"[illegible] 20
MTR.",,,"PHONE PRIVILEGES",,,"1
4.2 - 14.35 MHZ"
1338 RETURN
1341 PRINT AT 1,0;"[illegible] 15
MTR.",,,"PHONE PRIVILEGES",,,"2
1.27 - 21.45 MHZ"
1344 RETURN
1347 PRINT AT 1,0;"[illegible] 10
MTR.",,,"PHONE PRIVILEGES",,,"2
8.5 - 29.7 MHZ"
1350 RETURN
1353 PRINT AT 1,0;"[illegible] 2
MTR.",,,"PHONE PRIVILEGES",,,"14
4.1 - 148.0 MHZ"
1356 RETURN
1359 PRINT AT 1,0;"[illegible] 60 MT
R.",,,,"CU PRIVILEGES",,,,"3.5 -
 3.775 MHZ"
1362 RETURN
1365 PRINT AT 1,0;"[illegible] 40 MT
R.",,,,"CU PRIVILEGES",,,,"7.0 -
 7.15 MHZ"
1368 RETURN
1371 PRINT AT 1,0;"[illegible] 20 MT
R.",,,,"CU PRIVILEGES",,,,"14.0
 - 14.2 MHZ"
1374 RETURN
1377 PRINT AT 1,0;"[illegible] 15 MT
R.",,,,"CU PRIVILEGES",,,,"21.0
 - 21.25 MHZ"
1380 RETURN
1383 PRINT AT 1,0;"[illegible] 10 MT
R.",,,,"CU PRIVILEGES",,,,"28.0
 - 28.5 MHZ"
1386 RETURN
1389 PRINT AT 1,0;"[illegible] 2 MTR
.",,,,"CU PRIVILEGES",,,,"144.0
 - 144.1 MHZ"
1392 RETURN
1395 PRINT AT 1,0;"[illegible] 60 MT
R.",,,,"PHONE PRIVILEGES",,,"3.7
75 - 4.0 MHZ"
1398 RETURN
1401 PRINT AT 1,0;"[illegible] 40 MT
R.",,,,"PHONE PRIVILEGES",,,"7.1
5 - 7.3 MHZ"
1404 RETURN
1407 PRINT AT 1,0;"[illegible] 20 MT
R.",,,,"PHONE PRIVILEGES",,,"14.
2 - 14.35 MHZ"
1410 RETURN
1413 PRINT AT 1,0;"[illegible] 15 MT
R.",,,,"PHONE PRIVILEGES",,,"21.
25 - 21.45 MHZ"
1416 RETURN
1419 PRINT AT 1,0;"[illegible] 10 MT
R.",,,,"PHONE PRIVILEGES",,,"28.
5 - 29.7 MHZ"
1422 RETURN
1425 PRINT AT 1,0;"[illegible] 2 MTR
.",,,,"PHONE PRIVILEGES",,,"144.
0 - 148.0 MHZ"
1428 RETURN
1431 GOTO 1434
1434 PRINT
1437 PRINT "DO YOU WISH A NEW FR
EQUENCY","CHECK (Y/N)?"
1440 GOSUB 6
1443 IF INKEY$="Y" THEN GOTO 930
1446 IF INKEY$="N" THEN GOTO 24
1449 GOTO 1440
1452 CLS
1455 PRINT AT 8,3;"73 AND GOOD D
X ---"
1458 PRINT AT 12,16;"KRAIG."
1461 STOP
```

```
MAY 30   FLUX=100   SUNSPOT=46.78
RCVR LAT 40.55   XMTR LAT -40.55
     LON 74.42        LON 74.42
BEARING= 180 DEG      MILES= 5595
 MAXIMUM USABLE FREQUENCY GRAPH
 28MHZ
 24MHZ
 21MHZ
 18MHZ
 14MHZ
 10MHZ
  7MHZ
  4MHZ
  2MHZ
 UTC
 HOUR>00   04   08   12   16   20  23
```

MAX. USABLE FREQ. PROG.

```
MAY 30   FLUX=100   SUNSPOT=46.78
RCVR LAT 40.55   XMTR LAT -40.55
     LON 74.42        LON 74.42
BEARING= 180 DEG      MILES= 5595
 MAXIMUM USABLE FREQUENCY TABLE
 UTC    MHZ        UTC    MHZ
 0      21.57      1200   23.41
 100    19.88      1300   25.85
 200    18.46      1400   27.91
 300    17.27      1500   29.66
 400    16.28      1600   31.12
 500    15.46      1700   32.35
 600    14.8       1800   33.29
 700    14.26      1900   34.02
 800    13.83      2000   34.53
 900    13.48      2100   33.24
 1000   13.2       2200   30.55
 1100   20.48      2300   26.08
```

(SEE ARTICLE FORWARD 3 PAGES)

```
0005 REM "TSMUF-4"
0010 REM SEE  12/82 QST MAGAZINE
0015 REM P.36  FOR INSTRUCTIONS
0020 REM MINIMUF 3.5 BY K6GKU
0030 REM ROBERT B. ROSE
0040 REM NAVAL OCEAN SYSTEMS CTR
0050 REM SAN DIEGO, CA.  92152
0060 REM TSMUF-4 (C)1983 BY KQ2F
0070 REM ROBERT A. O'LEARY
0080 REM 21 KATE TERRACE
0090 REM PISCATAWAY, N.J. 08854
0095 REM THANKS K1UFS FOR  INPUT
0100 REM  AND W6AMW FOR BRNG/DIST
0105 FAST
0110 LET  X=1
0120 LET  D$="312831303130313130313031"

0140 LET  M$="JANFEBMARAPRMAYJUNJULAUGS
EPOCTNOVDEC"
0150 LET  K0=PI/180
0155 LET  PI=2*PI
0160 LET  R1=180/PI
0170 LET  P0=PI/2
0180 CLS
0185 PRINT AT 0,13;" TSMUF-4 "
0190 PRINT ,,"ENTER XMTR LATITUDE: ";
0200 INPUT L1
0201 LET  L3=L1
0202 LET  L1=INT (L1*100)/100
0205 PRINT L1
0207 LET  L7=L1
0210 IF L1)=-90 AND L1<=90 THEN
 GOTO 0225
0215 PRINT "INVALID LATITUDE. MUST BE I
N THE        RANGE -90 TO +90."
0220 GOTO 0190
0225 PRINT ,,"ENTER XMTR LONGITUDE: ";
0230 INPUT W1
0231 LET  W3=W1
0232 LET  W1=INT (W1*100)/100
0235 PRINT W1
0237 LET  W7=W1
0240 IF -180<=W1 AND W1<=180 THEN
 GOTO 0265
0250 PRINT "INVALID LONGITUDE. MUST BE
IN           THE RANGE -180 TO +180."
0260 GOTO 0225
0265 IF X=2300 THEN  GOTO 0488
0266 CLS
0267 PRINT ,"XMTR LAT ";L1,TAB 21;"LON
";W1
0270 PRINT ,,"ENTER RCVR LATITUDE: ";
0280 INPUT L2
0281 LET  L4=L2
0282 LET  L2=INT (L2*100)/100
0285 PRINT L2
0287 LET  L8=L2
0290 IF L2>=-90 AND L2<=90 THEN
 GOTO 0305
0295 PRINT "INVALID LATITUDE. MUST BE I
N THE        RANGE -90 TO +90."
0300 GOTO 0270
0305 PRINT ,,"ENTER RCVR LONGITUDE: ";
0310 INPUT W2
0311 LET  W4=W2
0312 LET  W2=INT (W2*100)/100
0315 PRINT W2
0317 LET  W8=W2
0320 IF -180<=W2 AND W2<=180 THEN
 GOTO 0345
0330 PRINT "INVALID LONGITUDE. MUST BE
IN           THE RANGE -180 TO +180."
0340 GOTO 0305
0345 IF X=2200 THEN  GOTO 0488
0346 CLS
0348 PRINT "RCVR LAT ";L2,"XMTR LAT ";L
1
0349 PRINT TAB 5;"LON ";W2;TAB 21;"LO
N ";W1
0350 PRINT ,,"ENTER NUMERICAL MONTH: ";

0360 INPUT M0
0362 LET  M0=INT M0
0365 PRINT M0
0370 IF 1<=M0 AND M0<=12 THEN
 GOTO 0381
0375 PRINT "INVALID MONTH. MUST BE IN T
HE          RANGE 1 TO 12."
0380 GOTO 0350
0381 LET  A$=M$(3*M0-2 TO 3*M0)
0382 PRINT TAB 26;"(";A$;")"
0385 PRINT "ENTER NUMERICAL DAY: ";
0390 INPUT D6
0391 LET  D6=INT D6
0392 PRINT D6
0400 LET  D5=VAL D$(2*M0-1 TO 2*M0)
0405 IF 1<=D6 AND D6<=D5 THEN
 GOTO 0420
0410 PRINT "INVALID DAY. MUST BE IN THE
          RANGE 1 TO ";D5
0415 GOTO 0385
0420 IF X=2000 THEN  GOTO 0490
0421 CLS
0422 PRINT "DATE: ";A$;" ";D6
0423 PRINT "RCVR LAT ";L2,"XMTR LAT ";L
1
0425 PRINT TAB 5;"LON ";W2;TAB 21;"LO
N ";W1
0430 PRINT ,,"ENTER WWV SOLAR FLUX NO.
";
0435 LET  B4=.70710678
0440 LET  X5=132
0445 LET  Y5=176
0450 INPUT Y4
0452 LET  Y4=INT Y4
0454 PRINT Y4
0456 IF Y4<=180 THEN  GOTO 0470
0458 LET  S9=Y4-44
0460 IF S9<0 OR S9>200 THEN  GOTO 04
80
0465 GOTO 0488
0470 LET  D4=(Y5-Y4)*.001+B4
0472 LET  S9=X5-(1000*(B4-COS ASN D4)
)
0474 LET  S9=INT ((S9+.305)*100)/100
0476 GOTO 0460
0480 PRINT ,,"COMPUTED SUNSPOT NUMBER W
AS < 3 OR >200.  ENTER SOLAR FLUX NUMBER
THAT IS > 65 OR <= 244."
0485 GOTO 0430
0488 GOSUB 8000
0490 CLS
0500 PRINT A$;" ";D6;"  FLUX=";Y4;"  SU
NSPOT=";S9
0510 PRINT "RCVR LAT ";L2,"XMTR LAT ";L
1
0520 PRINT TAB 5;"LON ";W2;TAB 21;"LO
N ";W1
0530 PRINT "BEARING= ";C12;" DEG";TAB
20;"MILES= ";C11
0540 IF X=5000 THEN  RETURN
0565 PRINT "  MAXIMUM USABLE FREQUENCY T
ABLE  "
0570 PRINT "  UTC   MHZ  ","  UTC   MHZ  "
0575 GOTO 8800
0581 PRINT AT 19,0;" MENU (C)ALCULATE,
 (P)RINT-OUT,"
0582 PRINT AT 20,0;"(G)RAPH,  OR CHAN
GE: (S)OL FLUX,(R)CVR QTH, (X)MTR QTH,
D)ATE"
0583 IF X=6000 THEN  RETURN
0584 PAUSE 4E4
0586 IF INKEY$="C" AND X<>0 THEN
 GOTO 0600
0587 IF INKEY$="G" AND X=0 THEN
 GOTO 5000
0590 IF INKEY$="D" THEN  GOTO 2000
0592 IF INKEY$="S" THEN  GOTO 2100
0594 IF INKEY$="R" THEN  GOTO 2200
0596 IF INKEY$="X" THEN  GOTO 2300
0597 PRINT AT 19,0;"
          (96 SPACES)
0598 IF INKEY$="P" THEN  LET P=
USR 8198
0599 GOTO 581
0600 PRINT AT 19,0;"
          (96 SPACES)
0601 IF 250)C11 OR C11)6000 THEN
 PRINT AT 11,0;"
          (88 SPACES)
0602 DIM H(24)
0603 DIM I(24)
0605 LET  L1=L1*R0
0610 LET  W1=W1*R0
0620 LET  L2=L2*R0
0630 LET  W2=W2*R0
0640 FOR N=0 TO 11
0645 LET  T5=N
0650 GOSUB 1000
0653 LET  J9=INT (J9*100)/100
0655 PRINT AT T5+6,0;T5*100;TAB 6;J9
0656 LET  H(T5+1)=T5
0657 LET  I(T5+1)=J9
0658 PAUSE 90
0660 NEXT N
0665 FOR N=12 TO 23
0670 LET  T5=N
0675 GOSUB 1000
0678 LET  J9=INT (J9*100)/100
0680 PRINT AT T5-6,16;T5*100;TAB 22;J
9
0681 LET  H(T5+1)=T5
0682 LET  I(T5+1)=J9
0685 PAUSE 90
0685 NEXT N
0690 LET  X=0
0700 GOTO 0581
1000 REM - MINIMUF 3.5
1010 LET  K7=SIN L1*SIN L2+COS L1*
COS L2*COS (W2-W1)
1020 IF K7)=-1 THEN  GOTO 1050
1030 LET  K7=-1
1040 GOTO 1070
1050 IF K7<=1 THEN  GOTO 1070
1060 LET  K7=1
1070 LET  G1=ACS K7
1080 LET  K6=1.59*G1
1090 IF K6)=1 THEN  GOTO 1110
1100 LET  K6=1
1110 LET  K5=1/K6
1120 LET  J9=100
1130 FOR K=1/(2*K6) TO 1-1/(2*K6)
 STEP .9999-1/K6
1140 IF K5=1 THEN  GOTO 1160
1150 LET  K5=.5
1160 LET  R=SIN L2
1170 LET  Q=COS L2
1180 LET  A=(SIN L1-R*COS G1)/(Q*
SIN G1)
1190 LET  B=G1*K
1200 LET  C=R*COS B+Q*SIN B*A
1210 LET  D=(COS B-C*R)/(Q*SQR (1-C*C
))
1220 IF D)=-1 THEN  GOTO 1250
1230 LET  D=-1
1240 GOTO 1270
1250 IF D<=1 THEN  GOTO 1270
1260 LET  D=1
1270 LET  D=ACS D
1280 LET  W0=W2+SGN SIN (W1-W2)*D
1290 IF W0)=0 THEN  GOTO 1310
1300 LET  W0=W0+P1
1310 IF W0<P1 THEN  GOTO 1330
1320 LET  W0=W0-P1
1330 IF C)=-1 THEN  GOTO 1360
1340 LET  C=-1
1350 GOTO 1380
1360 IF C<=1 THEN  GOTO 1380
1370 LET  C=1
1380 LET  L0=P0-ACS C
1390 LET  Y1=.0172*(10+(M0-1)*30.4+D6)
1400 LET  Y2=.409*COS Y1
1410 LET  K8=3.82*W0+12+.13*(SIN Y1+1.
2*SIN (2*Y1))
1420 LET  K8=K8-12*(1+SGN (K8-24))*
SGN ABS (K8-24)
1430 IF COS (L0+Y2))-.26 THEN  GOTO
1520
1440 LET  K9=0
1450 LET  G0=0
1460 LET  M9=2.5*G1*K5
1470 IF M9<=P0 THEN  GOTO 1490
1480 LET  M9=P0
1490 LET  M9=SIN M9
1500 LET  M9=1+2.5*M9*SQR M9
1510 GOTO 1770
1520 LET  K9=(-.26+SIN Y2*SIN L0)/(
COS Y2*COS L0+1E-3)
1530 LET  K9=12-ATN (K9/SQR ABS (1-K
9*K9))*7.639437
1540 LET  T=K8-K9/2+12*(1-SGN (K8-K9/2
))*SGN ABS (K8-K9/2)
1550 LET  T4=K8+K9/2-12*(1+SGN (K8+K9/
2-24))*SGN ABS (K8+K9/2-24)
1560 LET  C0=ABS COS (L0+Y2)
1570 LET  T9=9.7*C0*T-9.6
1580 IF T9).1 THEN  GOTO 1600
1590 LET  T9=.1
1600 LET  M9=2.5*G1*K5
1610 IF M9<=P0 THEN  GOTO 1630
1620 LET  M9=P0
1630 LET  M9=SIN M9
1640 LET  M9=1+2.5*M9*SQR M9
1650 IF (4<T THEN  GOTO 1680
1660 IF (T5-T)*(T4-T5))0 THEN  GOTO 1
690
1670 GOTO 1820
```

```
1680 IF (T5-T4)*(T-T5)>0 THEN  GOTO 1
770
1690 LET  T6=T5+12*(1+SGN (T-T5))*
SGN ABS (T-T5)
1700 LET  G9=PI*(T6-T)/K9
1710 LET  G8=PI*T9/K9
1720 LET  U=(T-T6)/T9
1730 LET  G0=C0*(SIN G9+G8*(EXP U-
COS G9))/(1+G8*G8)
1740 LET  G7=C0*(G8*(EXP (-K9/T9)+1))*
EXP ((K9-24)/2)/(1+G8*G8)
1750 IF G0>=G7 THEN  GOTO 1770
1760 LET  G0=G7
1770 LET  G2=(1+S9/250)*M9*SQR (6+58*
SQR G0)
1780 LET  G2=G2*(1-.1*EXP ((K9-24)/3))

1790 LET  G2=G2*(1+(1-SGN L1*SGN L2)*
.1)
1800 LET  G2=G2*(1-.1*(1+SGN (ABS
(N L0-COS L0)))
1810 GOTO 1880
1820 LET  T6=T5+12*(1+SGN (T4-T5))*
SGN ABS (T4-T5)
1830 LET  G8=PI*T9/K9
1840 LET  U=(T4-T6)/2
1850 LET  U1=-K9/T9
1860 LET  G0=C0*(G8*(EXP U1+1))*EXP U
/(1+G8*G8)
1870 GOTO 1770
1880 IF G2>J9 THEN  GOTO 1900
1890 LET  J9=G2
1900 NEXT K
1910 RETURN
4000 REM CHANGE DATE
4010 LET  X=2000
4020 GOSUB 3000
4030 GOTO 0350
4100 REM CHANGE SOLAR FLUX NO.
4110 LET  X=2100
4120 GOSUB 3000
4130 GOTO 0430
4200 REM CHANGE RCVR QTH
4210 LET  X=2200
4220 GOSUB 3000
4230 GOTO 0270
4300 REM CHANGE XMTR QTH
4310 LET  X=2300
4320 GOSUB 3000
4330 GOTO 0190
4400 LET  L1=L7
4410 LET  W1=W7
4420 LET  L2=L8
4430 LET  W2=W8
4440 CLS
4450 RETURN
4000 CLEAR
4010 SAVE "TSMUF-4"
4020 RUN
5000 REM DRAW GRAPH
5010 LET  X=5000
5020 GOSUB 3000
5030 GOSUB 0500
5100 PRINT "MAXIMUM USABLE FREQUENCY G
RAPH"
5110 PRINT "28MHZ
5120 PRINT "
5130 PRINT "24MHZ";TAB 31;"
5140 PRINT "
5150 PRINT "21MHZ
5160 PRINT "
5170 PRINT "18MHZ
5180 PRINT "
5190 PRINT "14MHZ";TAB 31;"
```

```
5200 PRINT "10MHZ
5210 PRINT "
5220 PRINT "7MHZ";TAB 31;"
5230 PRINT "
5240 PRINT "4MHZ
5250 PRINT "
5260 PRINT "UTC";TAB 31;"
5270 PRINT "HOUR:00  04  08  12  16  2
0 24"
5280 GOTO 5900
5500 REM GRAPH PLOT SUBROUTINES
5510 FOR F=S-1 TO (Z+Y)/2+4 STEP -1
5515 IF F>33 THEN  NEXT E
5520 PLOT 0,F
5530 NEXT F
5590 GOTO 5940
5600 FOR F=S+1 TO (Z+Y)/2+4
5610 IF F>33 THEN  NEXT E
5620 PLOT 0+1,F
5630 NEXT F
5690 RETURN
5700 FOR F=S-1 TO Y+4 STEP -1
5705 IF F>33 THEN  NEXT E
5710 PLOT 0,F
5720 NEXT F
5730 GOTO 5945
5800 FOR F=S+1 TO Y+4
5810 IF F>33 THEN  NEXT E
5820 PLOT 0+1,F
5830 NEXT F
5890 RETURN
5900 REM  PLOT COORDINATES
5910 FOR E=1 TO 24
5912 LET  Z=I(E)
5913 IF I(E)>29.5 AND E=24 THEN
 GOTO 5950
5915 IF I(E)>29.5 THEN  NEXT E
5920 PLOT H(E)*2+14,Z+4
5922 LET  Q=PEEK 16438
5923 LET  S=PEEK 16439
5925 IF E=24 THEN  GOTO 5950
5927 LET  Y=I(E+1)
5930 IF Z>=Y THEN  GOTO 5500
5935 GOSUB 5600
5940 PLOT H(E)*2+15,((Z+Y)/2)+4
5941 LET  Q=PEEK 16438
5942 LET  S=PEEK 16439
5943 IF Z>Y THEN  GOTO 5700
5944 GOSUB 5800
5945 NEXT E
5950 FAST
5955 RAND USR 2591
5960 PRINT "(P)RINT-OUT OR (R)ETURN
 TO TABLE"
5970 PAUSE 4E4
5975 RAND USR 2591
5976 PRINT "(32 SPACES)

5980 IF INKEY$="P" THEN  LET  P=
USR 8198
5990 IF INKEY$="R" THEN  GOTO 6000
5995 GOTO 5955
6000 REM  RETURN  TO TABLE
6010 LET  X=5000
6020 GOSUB 0490
6100 FOR E=0 TO 11
6110 PRINT AT E+6,0;E*100;TAB 6;I(E+1
)
6120 NEXT E
6200 FOR E=12 TO 23
6210 PRINT AT E-6,16;E*100;TAB 22;I(E
+1)
6220 NEXT E
6225 LET  X=0
6230 GOTO 0584
```

```
8000 REM BEARING/DISTANCE
8010 DIM A(2)
8020 DIM B(2)
8025 LET  R10=3953
8030 LET  A(1)=PI*L4/180
8040 IF W4<=180 THEN  LET  B(1)=-1*(
PI*W4/180)
8045 IF W4>180 THEN  GOTO 8060
8050 GOTO 8070
8060 LET  W4=ABS (W4-360)
8065 LET  B(1)=PI*W4/180
8070 LET  A(2)=PI*L3/180
8080 IF W3<=180 THEN  LET  B(2)=-1*(
PI*W3/180)
8085 IF W3>180 THEN  GOTO 8095
8090 GOTO 8290
8095 LET  W3=ABS (W3-360)
8100 LET  B(2)=PI*W3/180
8290 LET  C10=COS (A(2))
8300 LET  X10=C10*COS (B(2))
8310 LET  C10=C10*SIN (B(2))
8320 LET  D10=SIN (A(2))
8330 LET  H10=SIN (A(1))
8340 LET  G10=COS (B(1))
8350 LET  J10=SIN (B(1))
8360 LET  K10=COS (A(1))
8370 LET  W10=G10*X10+J10*C10
8380 LET  E10=H10*W10-K10*D10
8390 LET  F10=G10*C10-J10*X10
8400 LET  G10=K10*W10+H10*D10
8410 IF ABS (G10)=1 THEN  GOTO 8470
8420 LET  W10=1-G10*G10
8430 IF W10>0 THEN  GOTO 8450
8440 GOTO 8470
8450 LET  H10=ATN (G10/SQR (W10))
8460 GOTO 8480
8470 LET  H10=G10*PI/2
8480 IF ABS (G10)=1 THEN  GOTO 8630
8490 IF W10<=0 THEN  GOTO 8630
8500 IF E10>=0 THEN  GOTO 8610
8510 IF E10<0 THEN  GOTO 8570
8520 IF F10>0 THEN  GOTO 8550
8530 LET  X10=-0.5*PI
8540 GOTO 8650
8550 LET  X10=PI/2
8560 GOTO 8650
8570 LET  X10=ATN (F10/E10)-PI
8580 IF F10<0 THEN  GOTO 8650
8590 LET  X10=X10+2*PI
8600 GOTO 8650
8610 LET  X10=ATN (F10/E10)
8620 GOTO 8650
8640 GOTO 8700
8650 LET  D10=180*(PI-X10)/PI
8660 LET  C10=INT (D10)
8670 IF D10-C10<0.5 THEN  GOTO 8690
8680 LET  C10=C10+1
8695 LET  C12=C10
8700 LET  D10=R10*(0.5*PI-H10)
8710 LET  C10=INT (D10)
8720 IF D10-C10<0.5 THEN  GOTO 8735
8730 LET  C10=C10+1
8735 LET  C11=C10
8750 RETURN
8800 IF X=6000 THEN  GOTO 581
8810 IF 250>C11 OR C11>6000 THEN
 PRINT AT 11,0;"THE MILES ARE < 250
 OR > 6000,  SO THE FOLLOWING CALCULATI
ONS  MAY NOT BE ACCURATE."
8820 GOTO 581
```

TSMUF-4 PROGRAM DESCRIPTION

TSMUF-4 IS THE SAME AS TSMUF-2 EXCEPT THAT WE HAVE ADDED BEARING AND DISTANCE CALCULATIONS (RELATIVE TO THE RECEIVING STATION), AND RE-FORMATTED THE DISPLAY TO ACCOMODATE THIS. IT ALSO WARNS YOU IF THE DISTANCE IS OUTSIDE THE ACCURACY RANGE (250 TO 6000 MILES) OF THE MUF CALCULATIONS. WE ALSO CORRECTED A PREVIOUSLY UNNOTICED ERROR IN THE ORIGINAL MINIMUF WHICH ALLOWED LONGITUDINAL VALUES FROM -360 TO +360 DEGREES. THEY ARE USUALLY EXPRESSED BETWEEN -180 TO +180 DEGREES (SEE LINES 240, 250, 320, AND 330). TSMUF-4 OCCUPIES 12K BYTES OF RAM AND LOADS IN 4 1/2 MINUTES.

MENU - ALLOWS YOU TO CHANGE ONE OR MORE PARAMETERS WITHOUT HAVING TO RE-ENTER ALL OF THEM. YOU CAN PRINT OUT A TABLE AND/OR GRAPH ON A CAI/P40 MODEL PINTER. IF YOU HAVE THE SINCLAIR/TIMEX PRINTER THEN CHANGE LINES 589 AND 5980 TO READ: IF INKEY$="P" THEN COPY NO PRINTER? DELETE THOSE LINES AND LINES 597, 5975, AND 5976 TO AVOID CRASHES. WANT TO WATCH THE GRAPH BEING PLOTTED? ADD LINE: 5040 SLOW IF YOU WOULD LIKE TO ELIMINATE THE PAUSE BETWEEN CALCULATIONS THEN DELETE LINES 658 AND 683.

SOLAR FLUX CONVERSION - THE SUNSPOT NUMBER IS CALCULATED FOR YOU. ENTER THE WWV SOLAR FLUX NUMBER, WHICH THEY BROADCAST AT 18 MINUTES AFTER EVERY HOUR. I WAS ABLE TO DERIVE A FORMULA FOR THE CURVE OF THE GRAPH ON P. 36 OF DEC. 1982 QST. ABOVE THE COORDINATES 176,132 THE GRAPH IS AN ALMOST-STRAIGHT LINE TANGENT AT 45 DEGREES. BELOW THOSE COORDINATES THE CURVE REPRESENTS APPROXIMATELY 8 DEGREES ARC OF A CIRCLE WITH RADIUS= 1000. THEREFORE, BY DIVIDING THE COORDINATES BY 1000 YOU GET A CIRCLE OF UNIT RADIUS. THIS NOW MEANS THAT Y= SIN THETA AND X= COS THETA, WHERE THETA IS THE CIRCULAR ANGLE IN RADIANS AT POINT X,X. USING THE ARCSINE FUNCTION YOU CAN NOW CALCULATE X BY KNOWING Y. SEE LINES 430 THROUGH 490.

IF YOU HAVE TO UPGRADE YOUR COPY OF TSMUF-2, MAKE THE CHANGES NOTED BELOW. LINE NUMBER CHANGES: TSMUF-2 LINE NUMBER 1 SHOULD BE 5, 100 SHOULD BE 95, 540 SHOULD BE 510, 550 SHOULD BE 520, 598 SHOULD BE 587, 588 SHOULD BE 598. MAKE SURE YOU DELETE THE OLD LINES. THE TEXTS OF THE FOLLOWING LINES ARE SLIGHTLY CHANGED: 5,60,240,250,265,320, 330,345,465,570(DELETE FIRST 2 COMMAS), 599,4010,5510,5515,5600,5610,5700,5705, 5800,5810,5920,5940,5960,AND 5995. ADD THE FOLLOWING TSMUF-4 LINES: 100, 201,231,281,311,488,530,575,597,601, 5955,5975,5976,AND 8000 THROUGH 8820. SAVE BY TYPING: GOTO 4000 ENTER >>>>> HAVE FUN AND 73, BOB- KQ2F <<<<<

(ARTICLE ON NEXT PAGE)

```
  10 REM "L NETWORK"
  20 PRINT
  30 PRINT "L NETWORK DESIGN BY
K5GK"
  40 PRINT
  50 PRINT TAB 10;"L"
  60 PRINT TAB 3;"O----UUUU----O
"
  70 PRINT TAB 6;":"
  80 PRINT TAB 6;":"
  90 PRINT "R1";TAB 5;"---";" C1
";TAB 18;"R2"
 100 PRINT TAB 5;"---"
 110 PRINT TAB 6;":"
 120 PRINT TAB 6;":"
 130 PRINT TAB 3;"O------------O
"
 140 PRINT
 150 PRINT "R1 VALUE (>R2)= ";
 160 INPUT R1
 170 PRINT R1
 180 PRINT "R2 VALUE= ";
 190 INPUT R2
 200 PRINT R2
 210 LET XL=SQR (R1*R2-R2**2)
 220 LET XC1=R1*R2/XL
 270 PRINT "XC1= ";XC1;" OHMS"
 280 PRINT "XL= ";XL;" OHMS"
 290 PRINT
 300 PRINT "(FREQ IN MHZ FOR C A
ND L)= ";
 310 INPUT F
 312 PRINT F
 315 LET F=F*1E6
 320 LET C1=1/(2*PI*F*XC1)
 325 LET C1=C1*1E12
 330 LET L=XL/(2*PI*F)
 340 LET L=L*1E6
 350 PRINT "C1= ";C1;" PF"
 360 PRINT "L= ";L;" UH"
```

```
L NETWORK DESIGN BY K5GK

          L
    O----UUUU----O
         :
         :
R1    --- C1        R2
      ---
         :
         :
    O------------O

R1 VALUE (>R2)= 150
R2 VALUE= 50
XC1= 106.06602 OHMS
XL= 70.710678 OHMS

(FREQ IN MHZ FOR C AND L)= 3.5
C1= 428.72206 PF
L= 3.2154154 UH
```

PI NETWORK DESIGN BY K5GK

```
    O----UUUU----O
         L
         :
         :
(R1)  ---     ---    (R2)
      ---     ---
         : C1    : C2
         :       :
    O------------O

R1 VALUE (>R2)= 1500
Q VALUE = 10
R2 VALUE= 50

DESIRED FREQ (MHZ)= 14
C1= 75.788068 PF
C2= 349.77651 PF
L = 1.9480831 UH
```

```
  10 REM "PI"
  20 PRINT
  30 PRINT "PI NETWORK DESIGN BY
 K5GK"
  35 PRINT
  40 PRINT
  50 PRINT TAB 3;"O----UUUU----O
"
  60 PRINT TAB 6;":";TAB 10;"L";
TAB 13;":"
  70 PRINT TAB 6;":";TAB 13;":"
  80 PRINT "(R1)";TAB 5;"---";TA
B 12;"---";TAB 18;"(R2)"
  90 PRINT TAB 5;"---";TAB 12;"-
--"
 100 PRINT TAB 6;":";" C1";TAB 1
3;":";" C2"
 110 PRINT TAB 6;":";TAB 13;":"
 120 PRINT TAB 3;"O------------O
"
 130 PRINT
 140 PRINT "R1 VALUE (>R2)= ";
 145 INPUT R1
 150 PRINT R1
 155 PRINT "Q VALUE = ";
 160 INPUT Q
 165 PRINT Q
 170 PRINT "R2 VALUE= ";
 175 INPUT R2
 180 PRINT R2
 210 LET XC1=R1/Q
 220 LET XC2=R2/SQR ((R2/R1)*(Q*
*2+1)-1)
 230 LET XL=(Q*R1/(Q**2+1))*(1+(
R2/(Q*XC2)))
 235 PRINT
 240 PRINT "DESIRED FREQ (MHZ)=
";
 250 INPUT F
 260 PRINT F
 265 LET F=F*1E6
 270 LET C1=1/(2*PI*F*XC1)
 275 LET C1=C1*1E12
 280 LET C2=1/(2*PI*F*XC2)
 290 LET C2=C2*1E12
 300 LET L=XL/(2*PI*F)
 310 LET L=L*1E6
 350 PRINT "C1= ";C1;" PF"
 360 PRINT "C2= ";C2;" PF"
 370 PRINT "L = ";L;" UH"
 380 PRINT
 390 GOTO 240
```

Maximum Usable Frequency Program

by

Bob O' Leary, KQ2F

This program, named TSMUF-4, is an enhanced version of Bob's previous program TSMUF-2 and details on upgrading, as well as the program description follows the program listing. Bob notes that this program is not to be used for commercial purposes!

Ham Helper Program

by

Kraig Pritts, KA2LHO

THIS IS AN ALL-AROUND HAM OPERATOR ASSISTANCE PROGRAM WRITTEN ORIGINALLY FOR A TRS-80 BY JACK MARTIN - WBXW AND PUBLISHED IN THE DEC. 1982 ISSUE OF 73 MAGAZINE. IT CAN BE AN EXTREMELY VERSATILE PROGRAM FOR THE HAM SHACK WITH AREAS OF OPERATION BEING REPEATER DIRECTORY, CONTEST DUPING, THIRD-PARTY TREATY DIRECTORY, Q-SIGNAL DIRECTORY, AND FREQUENCY ALLOCATION. THIS ADAPTATION USES NEARLY ALL OF THE 16K RAM AND SHOULD WORK ON BOTH THE ZX-81 AND T/S 1000 (I AM NOT SURE ABOUT THE 8K ROM ZX-80).

ALL INFORMATION WITHIN THE PROGRAM IS FOR MY LOCALITY AND PERSONAL HAM SHACK BUT IS EASILY ADAPTED FOR YOUR OWN NEEDS. ROOM HAS BEEN LEFT WITHIN LINE NUMBERING TO ADD MORE Q-SIGNALS OR REPEATER INFO WHERE NECESSARY (UP TO MEMORY LIMITATIONS).

ALL REM STATEMENTS HAVE BEEN DELETED DUE TO MEMORY RESTRICTIONS BUT A COMPLETE PROGRAM LAYOUT IS PRESENTED HERE TO ASSIST IN MODIFICATIONS TO VARIOUS ROUTINES. ALSO PRESENTED IS A LIST OF VARIABLE ASSIGNMENTS AND A LISTING OF INVERSE CHARACTERS USED IN THE PROGRAM TO PROVIDE FOR EASIER PROGRAM ENTRY.

IMPROVEMENTS ARE ALWAYS POSSIBLE AND I WOULD CERTAINLY APPRECIATE HAVING THEM SENT TO ME FOR USE IN THIS PROGRAM. IF ANYONE FEELS THEY DO NOT HAVE THE TIME TO TYPE IN THIS PROGRAM I WILL GLADLY SUPPLY A CASSETTE COPY AND THIS LISTING FOR $8.00.

Pi-Network Design Program

by

Jim Crosby, K5GK

THESE PROGRAMS MIGHT BE OF INTEREST TO SOME OF THE QZX SUBSCRIBERS. THE PROGRAM LABELED "PI" DRAWS A PI NETWORK AND LABEL EACH COMPONENT. IT THEN INSTRUCTS YOU AS INPUTS TO MAKE. THE END RESULT IS OF COURSE THE VALUE OF THE L AND C IN UH AND PF. THE PROGRAM LABELED "L NETWORK" DOES THE SAME WITH THIS MATCHING NETWORK.

THE FORMULAS USED WERE TAKEN FROM THE "RADIO AMATEUR HANDBOOK " 56TH EDITION AND THE RESULTS AGREE WITH THOSE TABULATED THERE

Editor's Doings

Well, was the June issue worth waiting for? I ventured over to a professional print shop, had 500 copies made and not only was pleased with the price, the quality was EXCELLENT! So, keep our subscriber list above 500 and we have it made. I am still experimenting with print styles and sizes and hope to settle down to something permanent soon By the way, I really appreciate all the nice 'print ready' articles, they save me a LOT of work.

In an attempt to get caught up, and to get a short rest, I have put together what would amount to 3 normal issues and called it the July & August issue. I hope you all feel that's fair enough, noting there are a dozen excellent articles in it. I have almost cleaned out our 'article reserves', and came up with an idea:

FREE UNCLASSIFIED AD

QZX will print a single FREE unclassifed ad for each subscriber.Please limit it to 50 words, related to computers & ham radio only. They will be printed in a first come first served space available basis.

That's about it, let's get on with it and get this mammoth issue out.

Unclassified

WANTED: Unclassified ads for publication in QZX. Cost is 1 cent for each keystroke (characters, blanks, etc). Payment must be included with order. This is an excellent way to sell your unwanted equipment, ask for help, find a specific program, etc. Send your ad in with payment to QZX, 2025 O' Donnell, Las Cruces, N.M. 88001.

FOR SALE: Contest Log Program, 16k. Stores 200 calls, RST, band, &

mode. Routines for duplicate call check, entering call again, void last call & its data, listing calls with data, & saving log while in progress or when log is full. Connect your printer and a running hard copy is made as data is entered. $8.00 ppd. for cassette. Orders sent 1st class mail. Add $1 for foreign. For info only, send SASE. WA0UZI, Jerry Matthews, 509 Collge, Storm Lake, Iowa 50588

FOR SALE: Machine Language Programmers - 13k disassembler "DA1". Allows you to browse the powerful routines in Sinclair's 8k ROM or check your own machine code by converting it to assembler statements. It converts all 812 regular & extended opcodes to Z80 assembler mnemonics. No external tables required. Jump to any point in ROM or RAM at any time. Built-in machine language loader/editor. Tape & instructions $9.00 ppd. Martin H. Irons, 46A Magic Circle Dr., Goshen, N.Y. 10924

FOR SALE: Program for ATV enthusiasts - Generate Large Character Messages. Two programs on one tape let you generate messages 4 times normal size. One program produces 10 screens that roll vertically. The other scrolls a large message from right to left. $9.00 ppd. Martin H. Irons, 46A Magic Circle Dr., Goshen, N.Y., 10924

FOR SALE: TS1000/ZX81 ASSEMBLER - DEBUGGER - Uses standard mnemonics in remark statements, has labels, symbols & 8 pseudo ops: ORG, DEFB, DEFW, DEFC, DEFS, EQU, REL, END. Assembles full instruction set at up to 1000 lines/minute, displays or prints listings. Debugger includes source code line renumbering, memory examine & modify, breakpoint with registers display. Occupies 7k. Cassette & comprehensive manual, $14.95 ppd. SCIENTIFIC SOFTWARE, 6 W. 61 Terrace, Kansas City, Mo. 64113

FOR SALE: TS1000/ZX81 DISASSEMBLER - Easy to use utility loads anywhere in memory, provides disassembled listing or hexadecimal dump to screen or printer. Includes memory search & modify. Can load & stop any program for disassembly or backup. Occupies 3.5k. Cassette & instructions, $14.95 ppd. SCIENTIFIC SOFTWARE, 6 W. 61 Terrace, Kansas City, Mo. 64113

FOR SALE: SATPLOT is a 16K 'tracking board program (circular orbits only) with a plastic map overlay kit for your screen. Shows satellite, space shuttle, etc. as a moving blip on a black background, in real time. Displays suborbital latitude and longtitude, azimuth & elevation & UTC. Features orbit scheduling, automatic QTH plot, resave, clock speed adjust, and much more. Use your AMS-81 program for precise tracking, then use SATPLOT for a visual display of the orbit. Comes with anticipated orbital data for the STS9 'ham in space' flight. North America, Caribbean, Hawaii only. $13.50 ppd., guaranteed. Bob Dalleske, W6AMW, Box 220, Mc Cloud, Calif. 96057.

Products in Review

This column will provide reviews of hardware 'add-ons', software, and books that are available for the Sinclair computers. Again, we will do reviews as our budget allows, or as they are loaned/donated by vendors for review. Reviews done by our subscribers will also be welcomed.

The first review is on Scientific Software's TS1000/ZX81 Assembler / Debugger (ZXAD) . (See the unclassified ads for ordering info). While I have used, both for enjoyment and on engineering jobs, many assemblers, debuggers, and monitors; I have only tried two on my Sinclair. Note my comments in an early issue on the serious shortcomings of the first one I tried. Well, Scientific Software's version has turned things around. The ad pretty well describes its features, and the inclusion of 'normal' pseudo ops makes this assembler well worth the money. A few words about the REL pseudo op, which is not featured in all assemblers. It allows you to assemble and inspect your machine language program in one area of memory and then use REL to move it to another. It takes care of all the address changes, etc. Since ZXAD is

resident during program development, you cannot put your object code in a 1 REM .... statement. You can move RAMTOP and put it there originally and then when debugging is complete you can delete ZXAD, use REL, and put your code in a 1 REM. I put mine in the 'hidden' memory above 8K in my 64K memory. As for using ZXAD, it was a dream to use and only one problem was encountered. It requires a space after the REM if no label is used. The space you get 'for free' when you enter REM does not count, you have to add one more. The debugger is a rather 'primitive' one as debuggers go and I am in the market for a better one. It allows you to examine & change memory contents and to set a breakpoint. Unless I screwed things up, to execute the code assembled with ZXAD, you enter PRINT USR (start address). Well, knowing my code had bugs but not knowing where, I put in a breakpoint and tried to run it. The program began to chase rabbits and I had to hit reset to regain control. This puts you back to square one! Most monitors I have used sort of artificially run your code and you can usually return to the monitor without reloading everything. As for program storage, I simply saved a copy of ZXAD with my source code in REMs (starting at the end of ZXAD). As for documentation, it consists of 21 half pages, is well done and thoroughly explains ZXAD. Missing is a nice simple example for the novices that are just moving into 'serious' machine language programming. However, if you will stay tuned to QZX I will come up with some and will be working with my S A S sort routines converting them to machine code. In summary, I highly recommend this one and am looking forward to using it a lot more.

Here's a brief 'review' of the Mule Electronics (444 Lincoln Blvd., Venice, Calif.90291) keytop symbols, sent to us from Bob, WA6DLI. He was extremely well pleased with them as was George, N3CHT who sent a nice letter along with several articles. The colored keytop symbols, with pressure adhesive are a real bargain at $9.95. They come with clear concise instructions and even have two sample keytops for you to experiment with. IF you are too feeble to put the samples on, or if they won't fit your keytops, you can return the 'kit' for a refund. By the way, these keytop symbols are for the surplus add-on keyboards, such as the $19.95 one I described earlier. The 'kit' also contains useful info on choosing and wiring an add-on keyboard. In summary, it looks like Mule Electronics has a winner for the add-on keyboard buffs. Its a shame they weren't around when I cut the black & white ones out of my Sinclair manual and spent hours taping them on.

QZX Friends

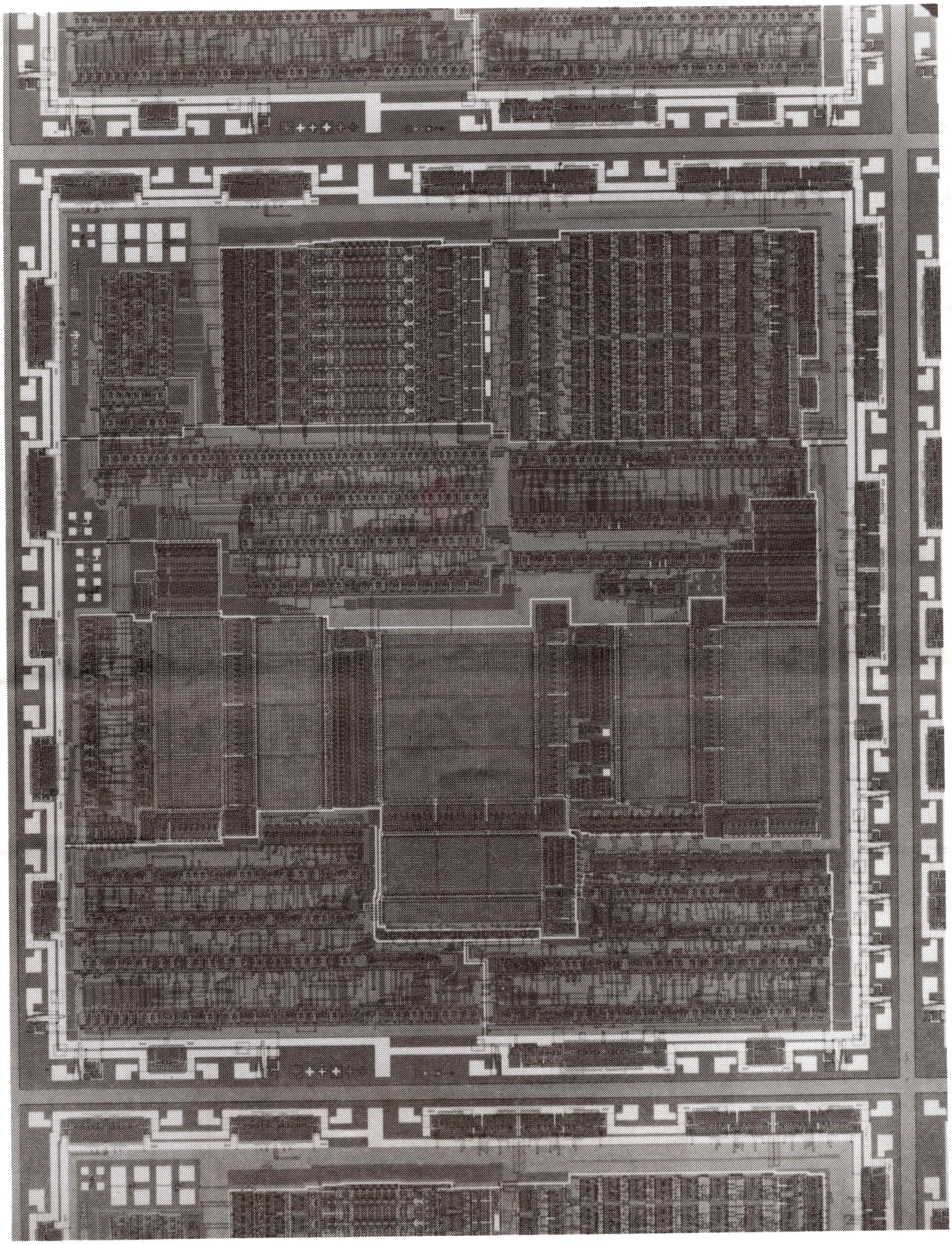
Here's your chance to let your ambitions and accomplishments be known. Feel free to let us know what you are up to, and to contact those 'doing your thing'.

W5QOU - Jack is a new TS1000 owner, one of the local gang, determined to learn about (or use) computers at the ripe age of 76.

QZX Net Info

Don't forget to send in corrections, deletions, etc.

Freq.	Time	Day	Source	Location
7.240	1700Z	Sun	KQ2F	East coast
146.67	0230Z	Tue	K5XY	Manhattan,NY
146.28	0000Z	Tue	N3ADF	Wash, DC
147.84	0200Z	Wed	WB5HVS	New Orleans
146.16	0000Z	Thu	N1CB	Vermont/NH
3.980	0100Z	Sat	N3CJP	East coast
14.345	0100Z	Thu	NU4V	USA
14.329	2000Z	Sun	W9CQD	USA
7.245	0001Z	Wed	W9CQD	USA
7.235	1800Z	Sat	W6AMW	West coast
7.228	1900Z	Sat	K4KEP	East coast
7.228	1900Z	Sun	K4KEP	East coast
146.04	0100Z	Thu	KB3YT	Pittsburgh



AERIAL PHOTO OF LAS CRUCES, N. MEX.

73, W4GHV and K5XY

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